

SUSTAINIA



→ A Guide to
100 sustainable
solutions



2012

→ A Guide to
100 sustainable
solutions



BUILDING THE WORLD
OF TOMORROW

WHO'S BEHIND?

The people behind Sustainia100

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Realdania, Dong Energy, DNV, Novo Nordisk, and Monday Morning

Sustainia Knowledge Partners

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THE SOLUTIONS ARE THERE - *LET'S GET INTO ACTION MODE*

I am back with a clear mission to make Sustainia a reality.

Sustainia is the world we could make possible if we work together across countries, regions, sectors and cultures. If we boldly implemented and scaled up the solutions to our sustainability challenges that are already available. Sustainia is my kind of world: a desirable place where we live life to the fullest. Without damaging the only planet we have.

Some will say our goal is impossible. We have all heard this kind of pessimism. I heard it when I wanted to be a world-leading body-building champion, a Hollywood movie star, and Governor of California. Each time, someone said "It can't be done." And each time, I proved them wrong. Now they say a green future can't be done, and we will prove them wrong again.

I'm an optimist, I love challenges and I know we can do this. Building fantastic, sustainable communities is possible today.

First, we have to stop listening to the naysayers and the pessimists. Sustainia100 is proof they're wrong. These solutions are fully developed and ready to be used on a large-scale. They're from all over the world; companies, states, cities, communities and people have come up with them on their own – because in addition to being better for our environment, they also make our lives better.

But we need to make sure the world knows about them!

We need to start talking about the good things that are happening. And showing the world what's possible. We have to excite people. You can have the best product in the world, but no one will buy it if your marketing is based on fear and guilt. Make sustainability sexy and attractive!

Sustainia100 is a clear demonstration of the benefits sustainable solutions hold. They can improve our lives now, if we get into the mode of action. Action – not talk. Enough with the talk!

The novelist Hermann Hesse said, "To achieve the possible, you must try the impossible".

Sustainia leads the way and demonstrates to us all that we can do this. We have what it takes. The building blocks are there – let's get going.

A sustainable future is Mission POSSIBLE. Don't let anyone tell you otherwise.

Governor

Arnold Schwarzenegger

*Honorary Chair of Sustainia & Founding
Chair of the R20 Regions of Climate Action*

THE
NOVELIST
HERMANN
HESSE
SAID, "TO
ACHIEVE THE
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IMPOSSIBLE"

EXECUTIVE SUMMARY



A GUIDE TO 100 READY AND AVAILABLE SUSTAINABLE SOLUTIONS

Sustainia100 guides you through exciting and inspiring solutions ready to be used today. We take you from solar power in Sudan to sustainable fashion in Switzerland; from water cooling in Canada to solar cooling in Singapore; and from buses in Brazil to smart buildings in Sydney.

*Sustainia100 takes you to **56 countries** on six continents (see the map on page 14-15). The solutions impact **10 different sectors** in a multitude of ways. Their cross-sectoral impacts and systemic character is a common denominator throughout this guide.*

*Sustainia100 solutions transform the way we produce and consume energy – leveraging the **energy** of the sun, the wind, and the tides. They revolutionize the grid that ties our energy system together, and they put us in charge of the way we consume energy in our **buildings**.*

*Sustainia100 solutions change the way we organize urban living in **cities** – putting sustainability at the center of city planning, with a focus on sustainable modes of **transportation** like biking, buses, and high-speed trains.*

*Sustainia100 solutions optimize the way we consume **resources** to produce things we care about like **food** and **fashion**, while emphasizing the rights and **health** of workers.*

*Sustainia100 solutions reform the way we think about **education** – how and what we teach; and they emphasize the pivotal role of **information technology** in improving our lives and reducing the impact we have on our environment.*

Sustainia100 demonstrates that the building blocks toward Sustainia are here. They are real and ready to be scaled. Today.

Sustainia100 is here to inspire you.

BUILDING A SUSTAINABLE SOCIETY

Sustainia is a clear and realistic vision of a sustainable society. It is a demonstration of how we could live tomorrow, and a collaborative platform to make it real.

A vision alone will not set the world on a more sustainable path. It needs to be concrete and inspiring. It needs to build on ready and available solutions, and be presented in a way that motivates action.

The Sustainia100 solutions are building blocks of Sustainia. Each solution represents one brick in the foundation of the sustainable society. This guide contains 100 bricks, but many more are out there and will be taken up and used in the near future. Each and every solution will help turn Sustainia into reality.

To identify the solutions, it is critical to **engage the broader sustainability community** – all those actually involved in developing and carrying out sustainable projects around the world. We therefore initiated an online campaign encouraging anyone with a good idea to submit their solution to Sustainia100.

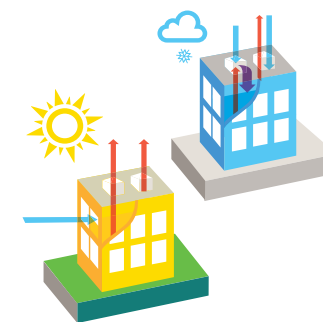
The response was overwhelming: **Solutions from students, multinational corporations, entrepreneurs and individual crusaders**, from Canada to Russia to Kenya, exhibited the diversity of sustainable innovation – and confirmed that it occurs at all scales and within all sectors.

Sustainia100 guides you through the world of existing solutions. It is a work in progress, as new innovations happen every day. Sustainia is therefore on a constant search for new solutions, and will publish a Sustainia100 guide each year. We aim to **inspire decision-makers to take action and citizens to embrace new and desirable lifestyles**.

The conclusion is clear: The solutions for a sustainable world are ready, available, and benefit everyone.

WE HOPE YOU WILL
BE INSPIRED.

FINDING THE SOLUTIONS: OUR CRITERIA



- Ready and available
- Scalable
- Collaborative
- Transformative
- Have environmental impact
- Cost effective
- Improve quality of life

We have developed a set of criteria reflecting the need to find existing solutions that have the potential to push our society in a more sustainable direction – that is, if we work together and use the solutions in

more places and across sectors. The Sustainia100 solutions are carefully selected via an assessment based on the above criteria.

More on the criteria and our methodology on page 146.

THE SUSTAINIA AWARD COMMITTEE:

- **Arnold Schwarzenegger**
Honorary Chair of Sustainia & Founding Chair of the R20 Regions of Climate Action
- **Connie Hedegaard**
European Commissioner for Climate Action
- **Gro Harlem Brundtland**
former Prime minister of Norway and former Director-General, World Health Organization (WHO)
- **Dr. Rajendra Pachauri**
Nobel Laureate and Chair, Intergovernmental Panel on Climate Change (IPCC)

NEXT STEPS IDENTIFYING THIS YEARS SUSTAINIA AWARD WINNER

Sustainia100 represents the people, companies, communities, and organizations that build the sustainable society. We want to celebrate them and the work they are doing. To that end, we have established an award, which will be selected from the Sustainia100.

The Sustainia Award honors outstanding performance within sustainability,

and is selected by a high-level committee of global sustainability leaders (see above).

Each year, Sustainia invites citizens and leaders from around the world to the Sustainia Award Ceremony. The announcement of the Sustainia Award winner will help generate global sustainability awareness and highlight sustainability's benefits and potential.

ANY SOLUTIONS WE SHOULD KNOW OF?

Sustainia will continue identifying great solutions. We do this because new solutions are developed every day, and because we want these solutions in your hands. We do not claim that the Sustainia100 are the best and the only solutions out there. Do let us know if there are solutions we should know about.

SEND YOUR
SOLUTION TO US

WWW.SUSTAINIA.ME

HOW TO READ THE SOLUTIONS

→ This guide takes you through 100 solutions. We describe the solution and zoom in on key aspects such as sectors, geography, and benefits on the triple bottom line of sustainability: social, economic, and environmental. This is what to look for when reading.

SECTORS

-  BUILDINGS
-  FOOD
-  FASHION
-  TRANSPORTATION
-  IT
-  EDUCATION
-  ENERGY
-  HEALTH
-  CITIES
-  RESOURCES

You will see that each solution is equipped with icons. They represent the sectors the solution impacts – the buildings we live in, the clothes we wear, the food we eat, the cities we inhabit, and more. Within each sector, great progress on sustainability is unfolding.

Many of the solutions in this guide impact more than one sector and are thus equipped with several icons. The cross-sectoral impact of most solutions reflects the holistic approach that characterizes sustainable solutions.

BIKE DELIVERY SERVICE

→ A carbon-neutral bike messenger system that solves the "last mile" problem for urban goods delivery.

ECONOMIC: Reduces per-item shipping costs by 50% just compared to conventional delivery services.

SOCIAL: Same-day delivery of online or mobile-ordered goods boosts productivity, and the need for bike messengers creates jobs.

ENVIRONMENTAL: CO₂-neutral delivery system.

WHY A SUSTAINABLE SOLUTION?

1. Parcel2Go and IKEA Germany will soon launch a carbon-neutral logistical system based on a heavy-duty bike delivery service. When IKEA opens its first city center store in Hamburg in 2014, bike messengers will provide same-day delivery of goods.

Bikes will be outfitted with specially designed and engineered heavy-load trailers, operable in any weather and capable of carrying 200 kg/200 lbs, which can be mounted to any kind of bike, e-bike, or e-scooter. App-based route-management software will streamline deliveries, minimizing empty trips and boosting the productivity of drivers. The bike delivery system will reduce harmful local air pollution, ease traffic congestion, reduce the cost of deliveries, and provide jobs for bike messengers.

2. Consumers increasingly demand same-day delivery of goods ordered via laptop or smart phone. Parcel2Go's carbon-neutral bike delivery offers shoppers a pain-free way to have purchases delivered directly to their home or office.

3. Hamburg, Germany



A PASSIVE COMMERCIAL BUILDING

→ Can the rigorous passive house standard be achieved in large commercial buildings? Yes, say the designers of O27, a mid-rise office tower planned for Oslo.

ECONOMIC: Achieving the rigorous passive house standard is expected to add slightly to the upfront cost, but will be recouped many times over in energy savings over the life of the building.

SOCIAL: Office spaces are arranged in a horizontal, shared layout that invites collaboration and collaboration.

ENVIRONMENTAL: O27 is expected to reduce CO₂ emissions by 50% compared to a conventional building of comparable size.

WHY A SUSTAINABLE SOLUTION?

1. The new Norway headquarters for NCC, a major Nordic construction and property development firm, is designed to meet the stringent passive house standard. The mid-rise office tower, with room for 600 workers, is slated to open in 2013.

O27 will be equipped with a suite of energy-saving technologies. An airtight, well-insulated building envelope will be coupled with a heat recovery ventilation system to ensure optimal indoor air temperatures. The ventilation system will recover 80% of the heat from exhaust air. Heavy percent of the heating demand will be met by a ground source heat pump. A green roof will both insulate the roof and absorb stormwater that would otherwise flow to the local wastewater system during heavy rains. Proximity to public transportation and onsite bicycle storage facilities ensure that O27 employees can make the daily commute without a car.

2. The O27 tower utilizes an established strategy: the passive house standard, to ensure significant energy savings and carbon reductions. A large team, including NCC, Henning Larsen Architects, and the consultancy Bushell, collaborated on a design that incorporated energy efficiency into the plan from the outset.

3. Oslo, Norway



DESCRIPTION:
A STRAIGHTFORWARD EXPLANATION OF HOW THE SOLUTION WORKS.

JUSTIFICATION:
THE KEY ARGUMENTS AS TO WHY THIS SOLUTION IS IN THE GUIDE.

IMAGE:
TO VISUALIZE THE SOLUTION

PROGRESS:
A BAR TELLS YOU WHERE YOU ARE.

WEBSITE:
FOR MORE INFORMATION.

GEOGRAPHY

Sustainia100 is a journey around the world. In the description for each solution the country (or countries) benefiting from the solution is highlighted. You'll discover that no matter where you are on the planet, solutions are just outside your door. From Kenya to Norway, Mexico to China, sustainable solutions are being developed, tested, and used every day.



THE TRIPLE BOTTOM LINE

→ Apart from the sector icons, the three icons below represent the triple bottom line of sustainability. For each solution, at least two of the three elements are highlighted:



Here you will find a key argument or statistic that illustrates the economic sustainability of the solution. Why and how does it have a positive economic impact?



Here you find a key argument or statistic that illustrates the social sustainability of the solution. How does it improve well-being and quality of life? How does it lead to greater social justice?



Here you find a key argument or statistic that illustrates the environmental sustainability of the solution. How does it limit negative environmental impacts? How does it improve sustainable use of resources?



HOW TO NAVIGATE THIS GUIDE

→ We aim to inspire. Different people are inspired by different solutions. We have divided the Sustainia100 solutions into six different stakeholder groups. This way you can easily pick out the solutions you find interesting.

The Citizen

- YOU make sustainable choices for yourself, your family and your community.

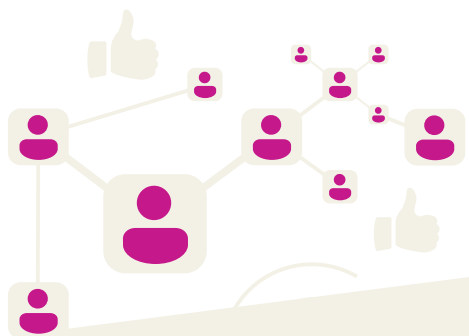
Solution { 1-17



The CEO

- YOU develop your company sustainably, with an emphasis on each of the triple bottom lines.

Solution { 18-34



The Advocate

YOU do the projects and share the knowledge, while reminding society of the importance of sustainability.

Solution { 35-50



The Engineer

- YOU design and bring to life the sustainable technology of tomorrow.

Solution { 51-67



The Venture Capitalist

- YOU think ahead and look for good investment opportunities with a unique sustainable potential.

Solution { 68-84



The Politician

- YOU provide the framework that drives societies in a more sustainable direction, while engaging the electorate in this collaborative effort.

Solution { 85-100

A WORLD OF SUSTAINABLE SOLUTIONS

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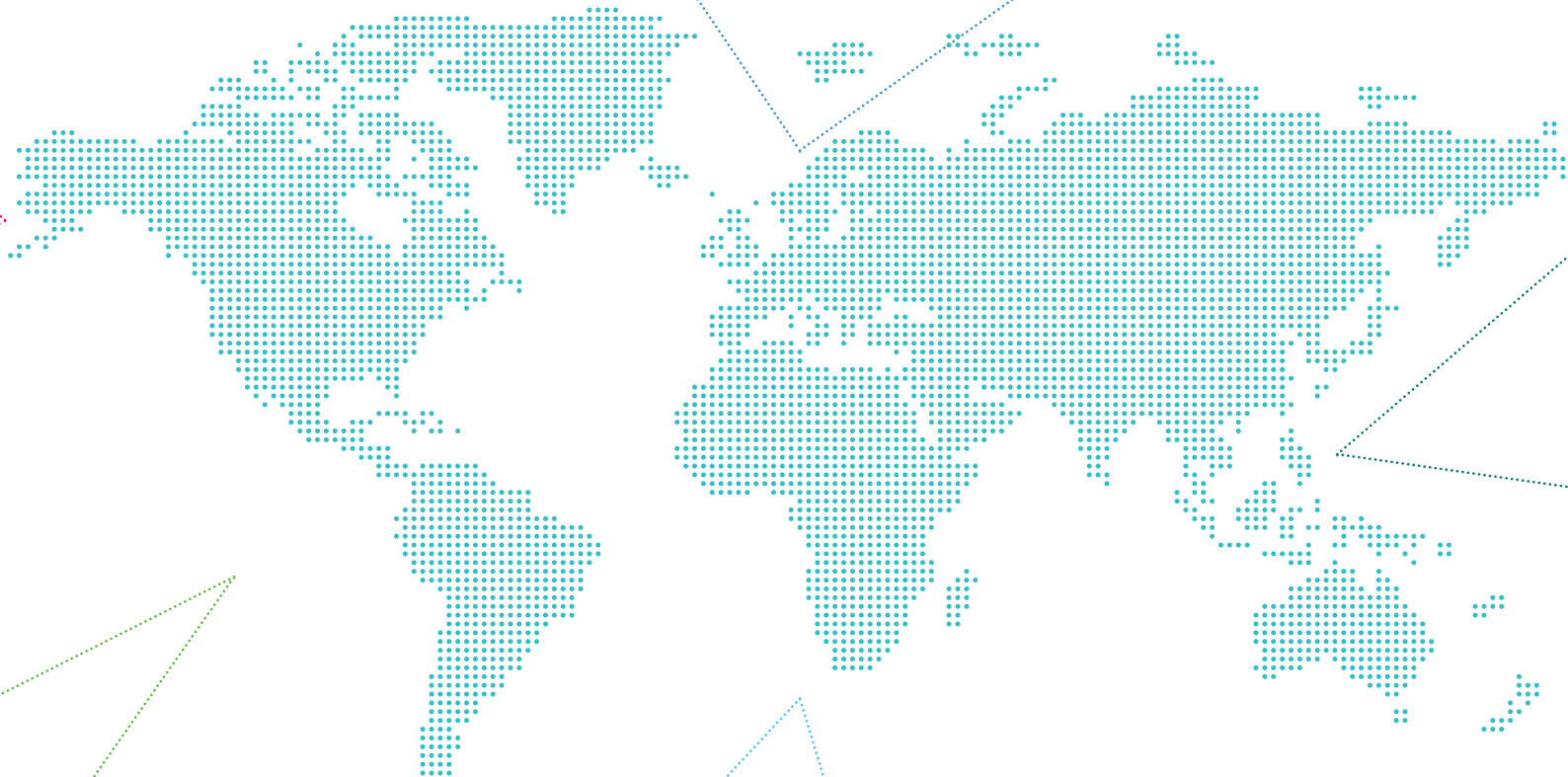
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The citizen

*YOU MAKE
SUSTAINABLE
CHOICES FOR
YOURSELF, YOUR
FAMILY AND YOUR
COMMUNITY*



SOLAR (EM)POWERING AFRICA

→ Combining the breakthrough potential of solar technology with a deliberately woman-centered direct sales network, this solution brings light, hope, and opportunity to even the most remote communities in rural Africa.



ECONOMIC

Every dollar invested in a Solar Sister Entrepreneur creates \$48 of economic benefit that extends to the entrepreneur and her customers



SOCIAL

Solar Sister addresses the needs of the 1.6 billion people living in energy poverty, 70% of whom are women and girls.



ENVIRONMENTAL

190 million tons of CO₂ is released into the atmosphere from kerosene use annually. That's equivalent to the emissions from 30 million cars.



UGANDA, RWANDA, SOUTH SUDAN



www.solarsister.org



TRANSPARENT FASHION



ECONOMIC

Full disclosure of material and production prices, plus mark-ups, assures complete information for costumers when buying a product.



SOCIAL

Honest by collections are produced only in countries where legislation ensures and enables good working conditions.



ENVIRONMENTAL

Certified organic fabrics and trims keep the environmental impact of the garments as small as possible.



BELGIUM

→ This new fashion label is 100% transparent. Shoppers can now see the full picture of how clothes are made: where the materials come from, how the products are manufactured, how much they cost to make, and how much they're being marked up.

THE SOLUTION

! Honest by creates desirable, sustainable designs and communicates the entire production process, from raw material to price calculation and carbon footprint. They conduct extensive research into sourcing raw materials and tracing the origins of fabrics and trimmings used in the products. This information – down to the safety pin, thread, and hangtag – is provided in great detail for each piece of clothing available on the website.

This approach ensures environmentally friendly production, the well-being of the clients, and that working conditions in production facilities are safe.

WHY A SUSTAINIA100 SOLUTION?

? Transparency in the fashion world is not only desirable but necessary. Total clarity to the customer enables fashion shopping with complete awareness of what is bought. Without transparency, a sustainable fashion industry will never be real. Honest by uses fashion as a tool to generate awareness among consumers and create the desire and demand for sustainable products.



www.honestby.com



ECONOMIC

Grocery retailing is a low-margin business. The REWE Green Building's energy-saving measures cut costs, save money, and attract new customers.



ENVIRONMENTAL

The REWE Green Building pilot store will prevent 435 tons of CO2 emissions annually.



GERMANY
(BERLIN)

SUSTAINABLE SUPERMARKETS

→ Grocery retailing is an incredibly competitive industry. Grocers that build supermarkets with sustainability in mind can cut costs, and shrink their environmental footprint, at the same time.

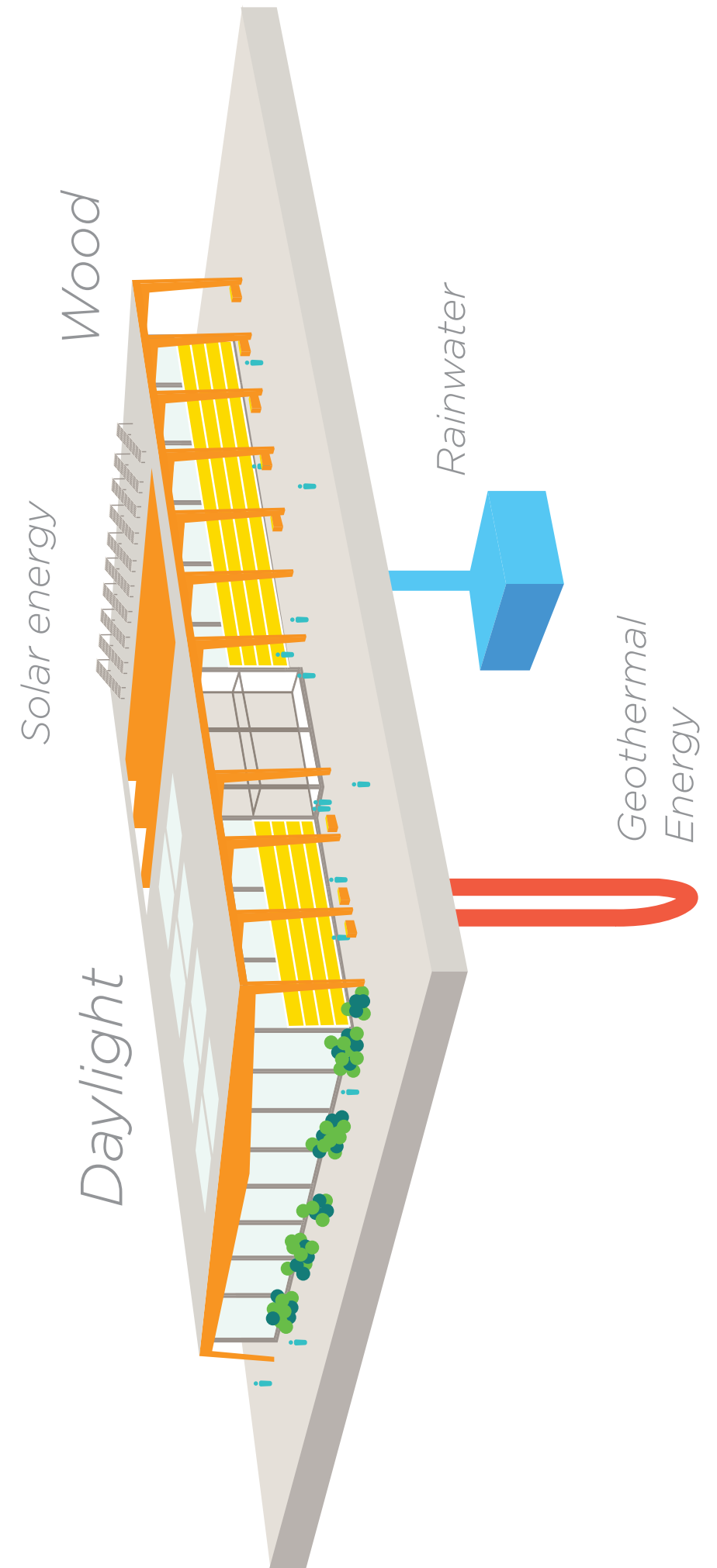
THE SOLUTION

! In November 2009, German grocer REWE opened a carbon-neutral supermarket in Berlin. The Green Building pilot store is the first supermarket in the world to receive the Sustainable Building Certificate in Gold from the German Sustainable Building Council.

A host of energy-savings measures deliver 40% savings compared to a standard REWE supermarket. The store is flooded with daylight; brightness sensors ensure that artificial lights turn on only when needed. Rooftop photovoltaic panels generate almost one-third of the electricity consumed by the store. A ground source heat pump maintains an ideal temperature in the supermarket in summer and winter. Harvested rainwater is used to clean the floors, flush toilets, and water the building's grounds.

WHY A SUSTANIA100 SOLUTION?

? REWE's Green Building pilot store is a proven concept. The project team, including Koch Architekten of Düsseldorf, constructed a sustainable building outfitted with off-the-shelf technology that can be deployed at supermarkets everywhere.





HYGIENE AS BUSINESS AND EDUCATION

→ Girls drop out of school, and women are hindered in their work, due to lack of affordable and available menstrual hygiene solutions in developing countries. For some, this is a 20% loss in school or work time.



ECONOMIC

Women who use Ruby Cup save money compared to what they pay for pads each month. The product creates livelihoods for the "Ruby Sales Ladies".



SOCIAL

Ruby Cup gives customers the freedom to study and work, the ability to pursue life opportunities, and improves their health.



ENVIRONMENTAL

Ruby Cup avoids the environmental impact otherwise created by disposable menstrual hygiene products

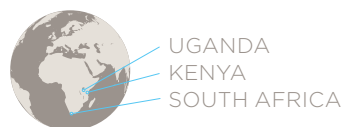
THE SOLUTION

! Ruby Cup is a safe, high-quality, and long-lasting menstrual hygiene product made of 100% medical-grade silicone that can be re-used for up to 10 years. It is inserted, emptied when full, reinserted, and boiled before the next use.

Ruby Cup is the only menstrual cup targeting women and girls in developing countries through low-cost pricing and direct sales distribution. Ruby Cup is sold through women entrepreneurs in order to generate income for women, increase peer-to-peer education in the communities, and provide a sustainable solution to menstruation.

WHY A SUSTAINIA100 SOLUTION?

? Menstruation is taboo, and often overlooked in discussions of basic female needs. Women and girls in developing countries face problems when they menstruate because they cannot afford sanitary pads. Ruby Cup is a safe, cost-saving one-time investment that allows women and girls to move freely for 10 years. It leaves no waste behind, and offsets the potential waste of disposable pads.



www.ruby-cup.com



THE INTELLIGENT HOME

→ Information technology puts you in charge of your energy consumption while improving convenience and security.



ECONOMIC

Reduced energy bills.



SOCIAL

Increased convenience, health, well-being and control.



ENVIRONMENTAL

Reduced energy consumption translates to reduced environmental impact.

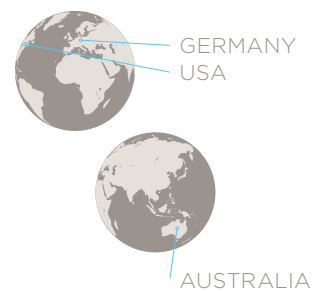
THE SOLUTION

! By integrating information and communications technology in the home, intelligent homes put you in charge of the energy consumption in your house. Intelligent homes cover a range of possibilities: automatic bathing solutions controlled via your phone, mood lighting, home cinemas, an "all-off button" and central heating controlled by a thermostat. Emphasizing convenience and security improvements for the homeowner, energy and monetary savings are delivered as a by-product of solutions, which improve your quality of life.

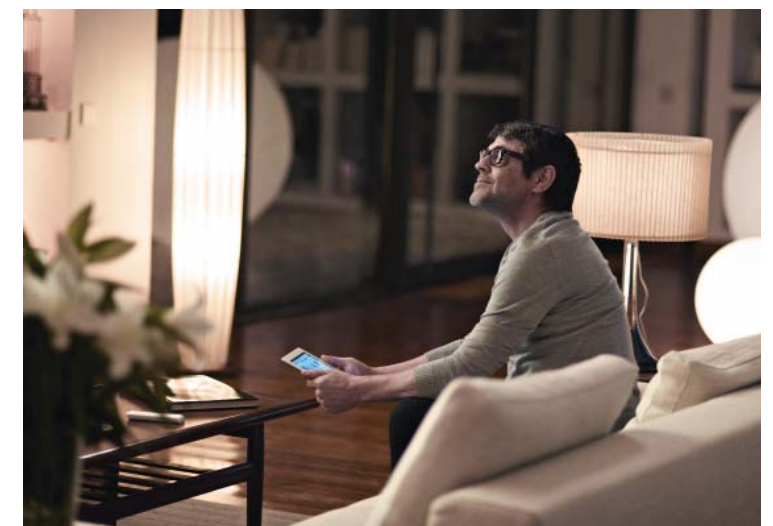
Intelligent homes give you control over your heating and energy-consuming appliances. It turns off the lights when you're not there. It warns you if you leave doors or windows open. It can time-manage other electrical devices so your washing is done when energy is cheap. And the kicker: All of these factors can be remotely controlled online or via your smartphone.

WHY A SUSTAINIA100 SOLUTION?

? Smart homes deliver energy savings and greater control of temperature, lighting, water usage, and ventilation. Smart and intelligent homes also make it much easier for the home owner to track energy consumption as the real-time display allows you an overview of which appliances consume a lot of energy. Intelligent homes also allow you to integrate your home into the greater smart grid.



www.cisco.com
www.rwe.com
www.ibm.com
www.switchautomation.com





SUBSTANTIAL AND SUSTAINABLE HEAT AT HOME

→ Advancements in heat pump technologies allow for use of naturally occurring energy from our surroundings to provide domestic spaces with heating and hot water.

THE SOLUTION

! Air, ground, and water contain useful heat continuously replenished by the sun. This energy can be utilized for domestic heating purposes. Heat pumps offer an energy-efficient alternative to conventional furnaces and air-conditioners – particularly in rural areas where the economics of district heating don't add up. Highly efficient, heat pumps can generate many times the heating or cooling energy they consume. They work by extracting energy as heat from the environment (the air, the water, or the ground) to supply space and water heating for buildings.

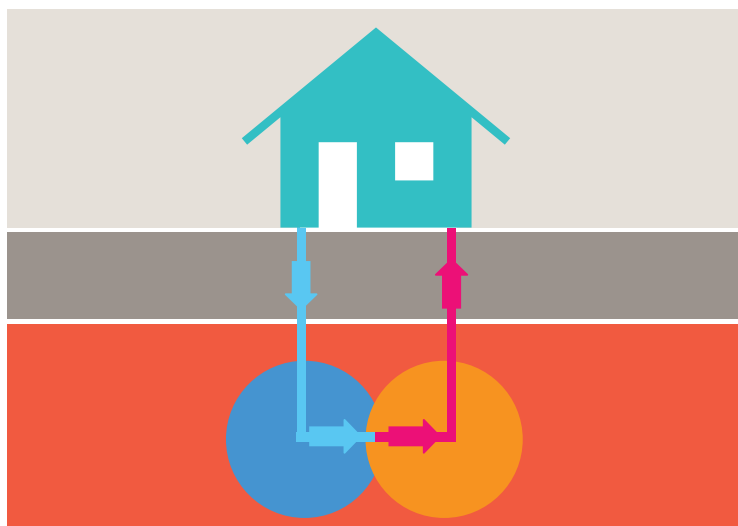
One such example is the Ecodan air source heat pump system by Mitsubishi Electric. It is a box affixed to a building's exterior, which harvests renewable energy from the outdoor air.

WHY A SUSTAINIA100 SOLUTION?

? Since heat pumps only need electricity to operate, and this electricity increasingly comes from renewable energy resources, heat pumps provide an energy-efficient, cost-effective, and environmentally friendly solution to heating challenges compared to conventional solutions – especially in rural areas.

ECONOMIC
Heat pumps powered by renewable energy resources result in energy savings due to a reduction in heating costs.

ENVIRONMENTAL
The Ecodan heating system reduces CO2 emissions by up to 50%.



www.mitsubishielectric.com



COMMUNITY OWNED SUPERMARKET

→ A community-based initiative in London has opened up a co-operative shop, “owned by the people, for the people,” focused on making the otherwise very bottom-line-oriented retail sector sustainable.

THE SOLUTION

! With a goal of running an all-round sustainable operation, People's Supermarket, in London, sells local produce, hires the local unemployed, and seeks to reduce food waste. Operating under a community-based not-for-profit business model, People's Supermarket asks locals to pay £25 annually for a share in the business and work 4 hours monthly in the supermarket. In return, they are granted a discount on groceries and a say in how the business is run and which goods are on the shelves.

Driven by the ambition to reduce food waste, People's Supermarket runs the People's Kitchen initiative. Here, produce that has reached its sell-by date is cooked and sold as ready-made meals to ensure that next to no food is wasted.

WHY A SUSTAINIA100 SOLUTION?

? People's Supermarket is an initiative targeting all three aspects of sustainability: social, environmental, and economic. With its food waste reduction measures, the supermarket reveals a path for reducing some of the 6.5 tons of food waste produced each year in the UK retail sector. And by selling locally produced goods, jobs are created in the local economy.

ECONOMIC
People's Supermarket is fostering local growth by selling mainly locally produced food products

SOCIAL
By employing clerks hired through unemployment programs, People's Supermarket is helping people climb the social ladder.

ENVIRONMENTAL
People's Supermarket is minimizing the environmental impact of retail by reducing food waste through their People's Kitchen program.



www.thepeoplesupermarket.org





TESTING THE LIVABILITY OF TOMORROW'S HOMES

→ Tested in real life, by real people - and with an audience. Six demonstration homes built throughout Europe are zero-carbon structures, utilizing renewable energy and based on principles ensuring a healthy indoor climate and environment.



ECONOMIC

Costs range from 1,500-2,000 € per m² - affordable for most home owners, especially when lower utility bills are taken into account.



SOCIAL

Upon completion, the houses were opened to the public for tours and information-sharing. An estimated 20,000 people visited the six sites.



ENVIRONMENTAL

The Model Homes are energy self-sufficient, based on renewable sources.

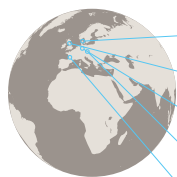
THE SOLUTION

! Initiated by VELUX, the project aims to tackle the challenges facing sustainable construction. The buildings are optimized to eliminate energy consumption for cooling in the summer, to capture passive solar heat gains in colder months, and to benefit from natural daylight year round. Control factors for energy performance are "intelligent": ventilation, windows, and other systems are integrated.

Families are living in and testing the homes. Researchers study the families' living habits, assessing how the homes measure up in livability.

WHY A SUSTAINIA100 SOLUTION?

? In the EU, residents spend 90% of their time indoors, in buildings that account for 40% of total energy consumption. Up to 30% of the building stock does not contribute to a healthy indoor climate, according to the WHO. The Model Home 2020 seeks to tackle these challenges in one holistic approach. The project provides solutions and ideas that can be implemented by others. Homes are tested in a variety of climates, to prepare solutions for different climate challenges.



- DENMARK
- UNITED KINGDOM
- GERMANY
- AUSTRIA
- FRANCE

www.velux.com/modelhome2020



Photos: Adam Mørk



REWARDING RECYCLING

→ Earn rewards for taking everyday green actions. An online game platform offers sweet deals and discounts on sustainable products in return for members reading educational green content or making eco-friendlier purchases.



ECONOMIC

More than 3,000 partners dispense rewards.



ENVIRONMENTAL

Rewarding recycling, biking, and walking encourages more sustainable behavior.

THE SOLUTION

! The idea is simple: instead of charging people for throwing out trash, RecycleBank offers rewards to those who recycle. So far, more than 3.6 million people have joined the website to collect tangible benefits for sustainable behavior.

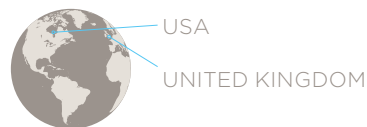
To earn rewards, people register at the RecycleBank website. There, they can play online games and quizzes, recycle product materials, purchase products, and much more to earn points.

It's the points that lead to rewards. They come in different flavors: products, discounts, or even donating points to support environmental education programs in schools.

Members can even earn points on the go. One app makes it possible to check in at selected trash bins and earn points for recycling. Another app introduces RecycleBank into urban transportation. Re:route encourages Londoners to walk and cycle by awarding points for each trip they re-route from conventional alternatives.

WHY A SUSTAINIA100 SOLUTION?

? RecycleBank is a matchmaker between large corporations, city governments, and everyday people. City governments save on waste, consumers earn rewards, and companies get exposure for their brand and products.



www.recyclebank.com



SMART METERS

→ These devices connect you to the smart grid while delivering cost savings and emissions reductions.



ECONOMIC

According to General Electric, smart meters can save utilities \$1.50 per meter per month on average compared to traditional meters. ²



SOCIAL

Smart meters enable consumers to participate in the smart grid.



ENVIRONMENTAL

General Electric estimates that a typical utility could reduce car fleet fuel consumption by 7,000 gallons annually by eliminating drive-by reading of meters. ³

THE SOLUTION

! Electricity meters count the kilowatt-hours consumed by a building each month. A traditional meter is analogue, which means it doesn't have the ability to communicate with other devices. It merely counts. Every month, you pay whatever it says you consumed.

A smart meter is digital, which means it can communicate with other devices in your home, as well as your utility. The smart meter is the critical piece of technology in your home enabling you to become an active participant in the electricity grid of the future – the smart grid. According to the U.S. Energy Information Administration, 20 million smart meters had been installed in the United States as of 2010. ¹

WHY A SUSTAINIA100 SOLUTION?

? Smart meters, by enabling the smart grid, deliver cost savings and productivity improvements for utilities and grid operators, which improves grid stability and reduces environmental impact.



www.ecomagination.com



1. EIA (2012): "FAQ: How many smart meters are installed in the U.S. and who has them?"
 2. General Electric, Ecomagination: "Smart Meters". www.ecomagination.com
 3. Ibid.



HIGH-END ELECTRIC CARS

→ Just a few years ago, electric vehicles (EV) were for tree huggers concerned about energy efficiency. Realizing that EVs would never take off if they were considered ugly, one company redefined our image of EVs from golf carts to “gimme, gimme, gimme.”



ECONOMIC

EVs are more energy efficient than conventional cars and can function as an energy reserve that power companies could tap when the car is idle.



ENVIRONMENTAL

Benefits includes reduced noise and less local air pollution, as EVs have no tailpipe greenhouse gas emissions. If they are charged with surplus wind energy, for instance, they run on green power. However, even if they run on fossil-based power, EVs emit less GHGs than conventional cars.

THE SOLUTION

! Electric vehicles are a sustainable solution. They reduce noise and local air pollution, are more energy efficient than conventional cars, and function as a giant battery for renewable energy in our cities. However, the great thing about Tesla Roadster is that these things don't matter. What matters is the sleek, stylish, sports car that goes from 0 to 100 kilometers per hour in 3.7 seconds. A great sports car – that just happens to be electric.

WHY A SUSTAINIA100 SOLUTION?

? The average EV has a range of around 120 kilometers, which might trigger range anxiety in some potential buyers. Furthermore, earlier EVs were ridiculed, as the look of the cars was said to please no one but hardcore environmentalists. The Tesla Roadster changed all that. The car accelerated into almost every ranking of sexiest sports cars in the world. Demand soared. And with a range of almost 400 kilometers on a single charge of its lithium-ion battery pack, most people were cured from range anxiety. Sadly, it costs an arm and a leg.



USA AND 14 OTHER COUNTRIES

www.teslamotors.com



ECO-LODGE WITH TINY CARBON FOOTPRINT

→ Luxury accommodations shouldn't require an over-sized carbon footprint. This ecolodge boasts environmental credentials as impressive as its surroundings.

THE SOLUTION

! The Chumbe Island Coral Park, a privately managed nature reserve located in Zanzibar, Tanzania, was designed to function with minimal environmental impact. Each building – the visitors' centre, education centre, and the ecolodge's guest bungalows – function as a self-sufficient unit that produces its own water and energy. Rooftop photovoltaic panels generate electricity for lighting, and solar hot water systems keep showers warm. Rainwater is collected by palm-thatched roofs, processed by combined gravel and sand filters, and stored for re-use in large cisterns under the floor of each building. Buildings are situated to take advantage of prevailing Indian Ocean trade winds that provide natural air-conditioning.

WHY A SUSTAINIA100 SOLUTION?

? The Chumbe Island Coral Park is a transformative project. Operating since 1991, it proves that tourism can tread lightly on the landscape. If designed from the beginning to minimize its environmental impact, an ecolodge can exist in harmony with its surroundings.



SOCIAL

The ecolodge sources as much food as possible locally, creating a thriving market for small farmers and local producers.



ENVIRONMENTAL

Chumbe Island is designed to prevent unwanted nutrients from entering the sensitive marine ecosystem nearby. Grey water from the showers, wash-basins, and kitchen is filtered before entering a plant bed sealed from its surroundings.



TANZANIA

www.chumbeisland.com



Photo: Markus Meissl



DESIGN THINKING IN CITY PLANNING



SOCIAL

Focusing on open green spaces for its citizens, more than 3 million trees have been planted in Seoul since 1998. The city recently created a \$224-million patch of urban woodland the size of Hyde Park, in London.²



ENVIRONMENTAL

A role model of public transportation, the Seoul Subway carries over 200 million passengers every year.³

→ Seoul is the first big city to implement a coherent design-based approach to improve life for its citizens. Design thinking has proven a success socially, environmentally, economically – and esthetically.

THE SOLUTION

! Design thinking is a method of investigating ill-defined problems and finding solutions to the challenges in the design and planning fields. It is the ability to combine empathy for context and creativity in the generation of solutions. In Seoul, it is combining sustainability and esthetics in urban planning.

Design Seoul is based on a vision to “design caringly for citizens”. This means caring for the environment, for living, for culture, and for the economy. The approach focuses on design solutions, not just to solve esthetic challenges, but also to solve social, environmental, and public health issues.

WHY A SUSTAINIA100 SOLUTION?

? More than half of the world’s population lives in cities. Seoul, winner of the 2011 “Index: Design to Improve Life Award,” puts the needs of its citizens at the center of city planning. The Index judges highlighted: “The Dasan Call Center, which is a telephone service that has revolutionized city services in Seoul; and the Gwanghwamun Square Project that has transformed part of a 16-lane road without a walkway into a new public space in downtown Seoul.”¹

1. Index: Design to Improve Life (2011): “Design Seoul.” www.designtoimprovelife.dk
2. Ibid.
3. Ibid.



Photo: INDEX: Design to Improve Life



SEOUL, SOUTH KOREA

www.seoul.go.kr



COMMUNITY COMPUTING



→ Download a screensaver and, when you are not at the keyboard, researchers can tap the processing power of your computer to help humanitarian research.

THE SOLUTION

! Does your personal computer ever use its screensaver? When it does, it could be saving the world. The World Community Grid connects individual users in a network that serves humanitarian research. Avoiding the energy consumption of large data centers, the World Community Grid has conducted research on finding a cure for cancer, improving the efficiency of renewable energy, and identifying more sustainable ways to use water.

By downloading a screensaver, users let the World Community Grid use their excess computational capacity to process information. Users receive points. The World Community Grid was created based on an experiment that helped scientists identify potential treatments for smallpox in less than 6 months using a community grid. Had the grid not been available, the research would have taken years to complete.

WHY A SUSTAINIA100 SOLUTION?

? With more than a half-million members and over 2 million connected devices, the World Community Grid is already leveraging unused computer capacity to serve humanitarian needs, while informing and including citizens across the globe.



ECONOMIC

To date, more than 2 million devices are connected to the World Community Grid, turning unused computer capacity into valuable processing power for humanitarian research..



SOCIAL

The World Community Grid is only available to public and not-for-profit organizations to use in humanitarian research.



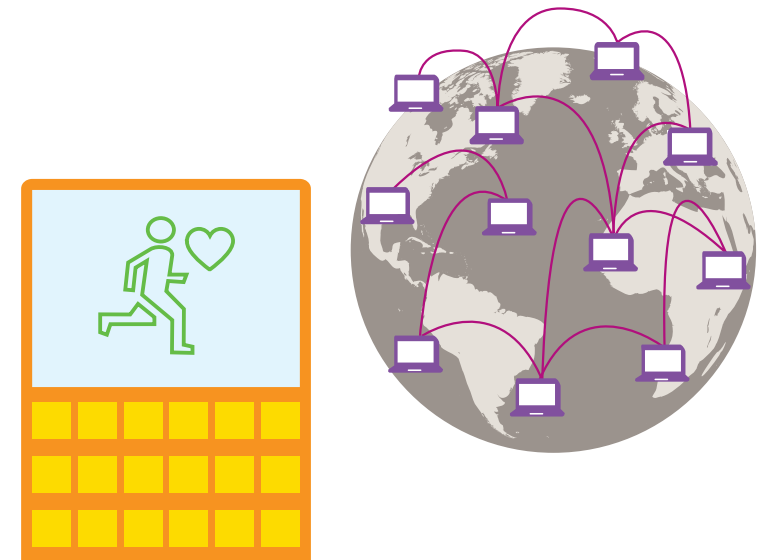
ENVIRONMENTAL

Utilizing unused computer capacity avoids the carbon footprint of large data centers.



USA

www.worldcommunitygrid.org





RECYCLE OLD CLOTHES WHEN SHOPPING FOR NEW

→ Recycling not only gives clothes a second life in developing countries; it also saves resources and energy used in making new garments. Now you can recycle while shopping and gain benefits, too.

THE SOLUTION

! Give unwanted clothes a second life – you'll keep usable garments from landfills and save valuable resources. British retailer Marks & Spencer has joined forces with Oxfam. They want to make clothes recycling as commonplace as recycling bottles and cans. How do they propose to do that? Get people “shwopping.” The idea is to get customers into the habit of recycling while shopping. Participating costumers take part in competitions and receive store credits.

The shwopped clothes are given to Oxfam to resell online, in their stores or in international markets. What they don't sell is recycled – high-quality material can be turned into new fabric; low-quality will be used for other purposes.

WHY A SUSTAINIA100 SOLUTION?

? According to M&S, around 1 billion pieces of clothing are sent to landfills in the UK each year. Non-recycled clothing has a very short lifespan and could potentially be turned into new raw materials or re-used by someone else. The goal of the shwopping campaign is to collect as much clothes as M&S sells in a year – 350 million pieces.



ECONOMIC

In the four years M&S has worked on clothes recycling with Oxfam, over 10 million items worth an estimated \$12.3 million have been donated.



SOCIAL

The shwopping campaign increases awareness of recycling of clothing and engages people in changing behavior.



ENVIRONMENTAL

According to M&S, 16 clothing items per person are sent to landfills each year in the UK.



UNITED KINGDOM



CAR-SHARING

→ Car-sharing schemes are gaining in popularity. They provide a cost-effective and sustainable means of transportation, while saving resources and valuable urban space. Next step: Electric cars.



ECONOMIC

Zipcar offers car-sharing services as a pay-as-you-drive service.



SOCIAL

Car-sharing adds to a sense of shared responsibility on the road to a more sustainable future.



ENVIRONMENTAL

Sharing cars makes possible more productive use of existing resources.

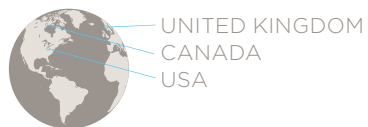
THE SOLUTION

! Car-sharing is an easy and cheap alternative to regular car rental. Zipcar facilitates responsible urban living by offering city dwellers the option of renting a vehicle as a pay-as-you-drive service, regardless of time and place. With the introduction of large-scale electric vehicle pilot programs, Zipcar also aims to bring sustainable transportation alternatives to city residents.

Zipcar's car-sharing service offers a subscription-based system for reserving cars based on four steps: 1) Join the Zipcar community; 2) Reserve the car you want, in the time slot, and in the location, you want; 3) Open the car with your "Zipcard"; and 4) Drive your car, and return it to the spot from which you left.

WHY A SUSTAINIA100 SOLUTION?

? Car-sharing schemes provide people access to an assortment of vehicles in various locations. The pay-as-you-drive service offers subscribers the benefits of vehicle mobility without the costs and responsibilities of vehicle ownership. The benefits of car-sharing include making better use of existing resources – instead of a car sitting idle, it can be used by someone else.



www.zipcar.com



THE FASHION LIBRARY

→ Say goodbye to a stuffed wardrobe filled with clothes worn only once. Fashion libraries lend fashionable clothes to its members and provide a home for your old purchases.



ECONOMIC

Borrowing an outfit you only wear a few times is cheaper than buying it.



SOCIAL

The Klädoteket community brings together theaters, movie producers, designers, and citizens. Community engagement is critical to engage the public in sustainable fashion consumption.



ENVIRONMENTAL

The fashion industry urgently needs to respond to challenges such as material shortages and climate change. Collaborative consumption and increased reuse of garments is one answer.

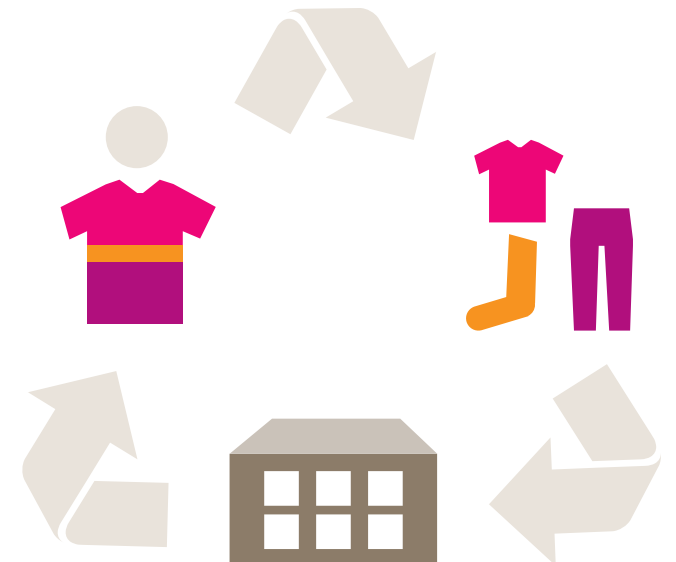
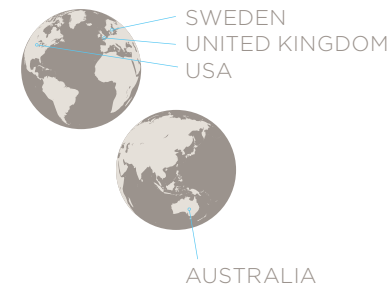
THE SOLUTION

! Sign up, pay a monthly fee, and lend your clothes – it's basically the same as your neighborhood library. In Malmö, Sweden, citizens are benefitting from the newly started Klädoteket. Members loan garments for up to three weeks, and local designers redesign the clothes that are bought or given to the store. The model takes second hand to a new level, creating a community around sustainable fashion consumption while establishing a platform for up-and-coming designers.

Around the world, the fashion library phenomenon is taking different forms. Fashionistas in New York City browse through Albright in search of the latest high-fashion pieces to lend. In the UK, expectant mothers can borrow maternity clothes for the duration of their pregnancy. And, in Western Australia, the Belmont Clothes Library lends apparel to the unemployed, so they can look smart for job interviews.

WHY A SUSTAINIA100 SOLUTION?

? The fashion industry has long been characterized as a consumerist culture using garments just a few times. Fashion libraries have the potential to increase reuse of garments and create a community around sustainable fashion. This alleviates pressures on global resources and local environments where clothes are produced.



www.kladoteket.se



The CEO

*YOU DEVELOP
YOUR COMPANY
SUSTAINABLY,
WITH AN EMPHASIS
ON EACH OF THE
TRIPLE BOTTOM
LINES*



BIKE DELIVERY SERVICE

→ A carbon-neutral bike messenger system that solves the “last mile” problem for urban goods delivery.



ECONOMIC

Reduces per-item shipping costs by 30% compared to conventional delivery services.



SOCIAL

Same-day delivery of online- or mobile-ordered goods boosts productivity, and the need for bike messengers creates jobs.



ENVIRONMENTAL

CO₂-neutral delivery system.

THE SOLUTION

! PureGREEN and IKEA Germany will soon launch a carbon-neutral logistical system based on a heavy-duty bike delivery service. When IKEA opens its first city centre store in Hamburg, in 2014, bike messengers will provide same-day delivery of goods.

Bikes will be outfitted with specially designed and engineered heavy-load trailers, operable in any weather and capable of carrying 200 kg/2.0 qm, which can be mounted to any kind of bike, e-bike, or e-scooter. App-based route-management software will streamline deliveries, minimizing empty trips and boosting the productivity of drivers.

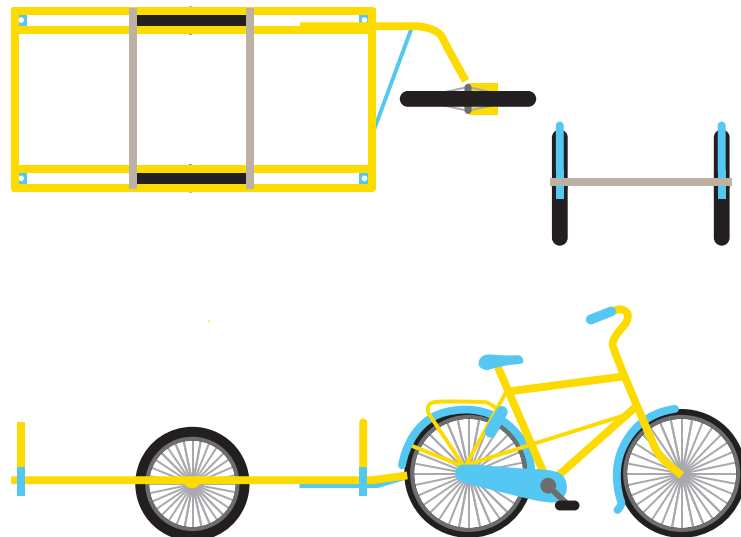
The bike delivery system will reduce harmful local air pollution, ease traffic congestion, reduce the cost of deliveries, and provide jobs for bike messengers.

WHY A SUSTAINIA100 SOLUTION?

? Consumers increasingly demand same-day delivery of goods ordered via laptops or smart phones. PureGREEN’s carbon-neutral bike delivery offers shoppers a guilt-free way to have purchases delivered directly to their home or office.



HAMBURG, GERMANY



www.ikea.com



A PASSIVE COMMERCIAL BUILDING

→ Can the rigorous passive house standard be achieved in large commercial buildings? Yes, say the designers of O27, a mid-rise office tower planned for Oslo.



ECONOMIC

Achieving the rigorous passive house standard is expected to add slightly to the upfront cost but will be recouped many times over in energy savings over the life of the building.



SOCIAL

Office spaces are arranged in a horseshoe-shaped layout that invites co-operation and collaboration.



ENVIRONMENTAL

O27 is expected to reduce CO₂ emissions by 50% compared to a conventional building of comparable size.



NORWAY

www.henninglarsen.com

THE SOLUTION

! The new Norwegian headquarters for NCC, a major Nordic construction and property development firm, is designed to meet the stringent passive house standard. The mid-rise office tower, with room for 650 workers, is slated to open in 2013.

O27 will be equipped with a suite of energy-savings technologies. An airtight, well-insulated building envelope will be coupled with a heat recovery ventilation system to ensure optimal indoor air temperature. The ventilation system will recover 85% of the heat from exhaust air. Ninety percent of the heating demand will be met by a ground source heat pump. A green roof will both insulate the roof and absorb storm-water that would otherwise flow to the local wastewater system during heavy rains. Proximity to public transportation and onsite bicycle storage facilities ensure that O27 employees can make the daily commute without a car.

WHY A SUSTAINIA100 SOLUTION?

? The O27 tower utilizes an established strategy, the passive house standard, to ensure significant energy savings and carbon emissions reductions. A large team, including NCC, Henning Larsen Architects, and the consultancy Ramboll, collaborated on a design that incorporated energy efficiency into the plan from the outset.





ZERO LANDFILL MANUFACTURING

→ Finding innovative ways to reuse and recycle all materials in automotive assembly facilities cuts costs and conserves resources.



ECONOMIC

SIA's environmental initiatives save the company millions of dollars annually, a saving passed on to the customer.



SOCIAL

Positive spin-offs, such as when sustainable work ethics encourage employees to implement sustainability in other areas of their life.



ENVIRONMENTAL

By reducing, reusing, and recycling 99.9% of its waste, SIA avoids sending any waste to a landfill.



USA

www.subaru-sia.com



E-TRADESHOW FOR SUSTAINABLE DESIGN

→ The first online tradeshow for global design inspiration makes sustainable design possible by connecting designers to a global network of suppliers.



ECONOMIC

Traditionally, SME material suppliers spend up to 43% of their marketing budgets on location-specific tradeshows every year.

Source4Style is a free online opportunity to showcase their products.



SOCIAL

40 million people work in manufacturing textiles and apparel - many in countries with lightly regulated working conditions.



ENVIRONMENTAL

Source4Style curates, merchandises, and selects suppliers based on a set of environmental and social criteria, giving those suppliers preference in the marketplace.



USA AND 70+ OTHER COUNTRIES

www.source4style.com

THE SOLUTION

! Source4Style services suppliers in over two dozen countries by directly connecting them to a designer network in 70+ countries around the world. The arrangement expands market access for small and medium sized enterprise (SME) suppliers focused on environmental, socially conscious, and fair trade principles.

In studies conducted by Source4Style and the Samuel Curtis Johnson Graduate School of Management at Cornell University, researchers discovered that designers spend up to 85% of their time sourcing - not designing. Suppliers spend up to 43% of their marketing budgets every year on tradeshows. Source4Style delivers the necessary technologies and market access to ensure efficient and sustainable sourcing.

WHY A SUSTAINIA100 SOLUTION?

? Giving designers and sourcing teams the opportunity to sustainably source materials is critical to achieving sustainability in the fashion industry. Textile manufacturing has a particularly large social and environmental footprint. Recent research from the Natural Resources Defense Council shows that textile manufacturing, specifically in China, is one of the biggest polluters, and a top 10 energy user, in the country.

Source4Style lowers the fashion industry's environmental footprint and offers designers a solution for one of the industry's biggest challenges - sourcing sustainably.





ENERGY PERFORMANCE CONTRACTING

→ Cash-strapped governments often lack the upfront capital needed to finance energy improvements. One solution: energy performance contracting.

THE SOLUTION

! In 2010, the German Army awarded energy service company Johnson Controls a contract to reduce energy consumption at the Oranienstein military base, in Diez. The project included retrofits to 24 buildings, including the Nassau-Orange Museum and a 17th-century castle, Schloss Oranienstein.

The financing vehicle used on the project, an Energy Performance Contract (EPC), is one governments increasingly employ to complete energy upgrades. Johnson Controls fronted the capital to pay for energy improvements and guaranteed delivery of the contracted energy savings. The German Army improved its facilities without an upfront cost, and, after Johnson Controls recoups its investment, will benefit from energy savings for years to come. Johnson Controls replaced an aging fossil-fuel boiler with one fuelled by woodchips, installed smart metres and a building management system, and replaced outdated lighting with more energy-efficient fixtures.

WHY A SUSTAINIA100 SOLUTION?

? Energy Performance Contracting is one of the most popular solutions used by governments around the world to fund energy upgrades. EPC is a proven solution that eliminates risk for governments (or companies) by guaranteeing energy savings that will save taxpayers' (or shareholders') money for many years.



ECONOMIC

After Johnson Controls completes the agreed energy improvements, the German Army can expect its energy costs to be cut nearly in half for Schloss Oranienstein.

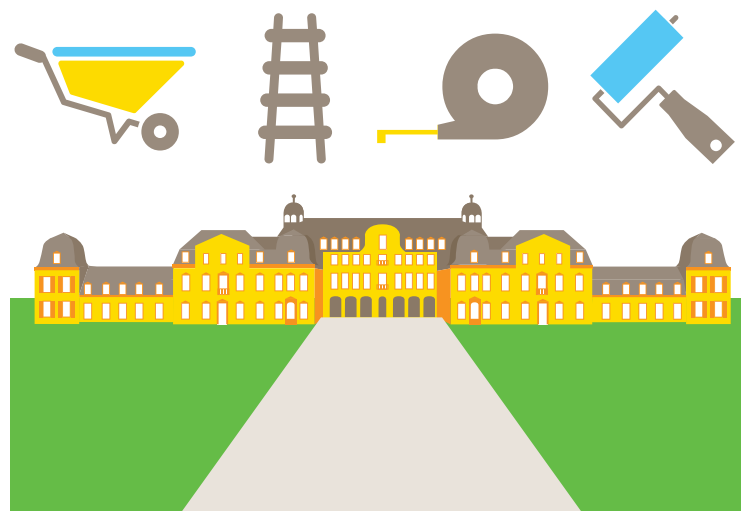


ENVIRONMENTAL

Energy retrofits undertaken at the Oranienstein base will reduce CO2 emissions by 55%.



GERMANY



www.johnsoncontrols.co.uk



THE GREEN OFFICE TOWER

→ Buildings account for 75% of greenhouse gas emissions in cities. But, if designed from the outset with sustainability in mind, buildings can slash emissions and achieve significant energy and water savings.

THE SOLUTION

! The Santander Tower, located in São Paulo, Brazil, uses a holistic approach to reduce its environmental impact. Water from the rainwater catchment system is used to irrigate gardens and in the air-conditioning cooling system. A vacuum flush system reduces water consumption by over 70% compared to the conventional system.

Occupancy sensors automatically turn off lights when rooms are not in use. Substituting fluorescent lamps with LEDs in the elevators reduced electricity consumption by 70%. Reflective glass prevents 80% of external heat from entering the building, reducing the need for air-conditioning.

Employees avoid taking unnecessary trips by car because many amenities – a gym, beauty salon, medical clinic, travel agencies, and restaurants – are located within the Santander Tower. The availability of an employer-sponsored carpool program and onsite bicycle parking also reduces the number of trips by car.

WHY A SUSTAINIA100 SOLUTION?

? The Santander Tower is equipped with a package of solutions that can be incorporated into new office towers, or retrofitted into existing commercial buildings, anywhere in the world.



ECONOMIC

Energy efficiency measures implemented at the Santander Tower save 200,000 kWh monthly.



SOCIAL

Santander Tower occupants don't just work in a sustainable building; they are encouraged to adopt sustainable practices in their daily routines. Many employees, for instance, carpool or ride a bike to work.

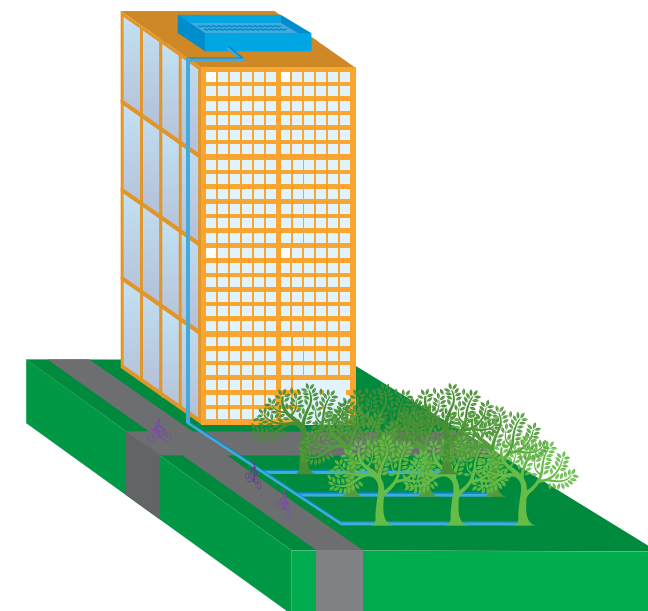


ENVIRONMENTAL

A suite of alternative transportation solutions used by Santander Tower employees removes 2,000 cars from the streets each day.



BRAZIL, SÃO PAULO



www.santander.com.br



SUSTAINABLE COTTON PRODUCTION

→ Sustainability eludes conventional cotton production. Yet it hasn't stopped consumers' love affair with clothing. So instead of boycotting cotton products, retailers are supplying sustainable alternatives.

THE SOLUTION

! Organic and fair-traded cotton is such an alternative. A collection of 450 cotton products have proven to be great business for Swiss retailer Coop and sustainable bio-cotton producer Remei AG. The companies focus on organic cotton production, ecological processing, and fair working conditions along the entire supply chain. Sustainability runs through the value chain like a continuous thread, from the farmer right through to the finished fashion garment.

Naturaline textiles are grown in India and Tanzania with over 8,000 farmers involved. All garments are produced using effective input management and controlled wastewater treatment that ensure cost-effective production without exposing workers to colors and toxic chemicals during processing.

A unique code in each T-shirt or undergarment makes the products traceable online all the way back to the region where the cotton was harvested, ensuring transparency for costumers.

WHY A SUSTAINIA100 SOLUTION?

? Collaborative efforts are essential in the fashion industry; only in this way can retailers ensure sustainability throughout the supply chain. Naturaline has proven that the business model exists.



ECONOMIC

From an initial 3 million Swiss francs in 1995, Naturaline sales reached 66 million in 2011.



SOCIAL

Organic farming enables the farmers to escape the spiral of debt, as they do not have to take out loans to purchase expensive chemicals and GMO seeds.



ENVIRONMENTAL

Local small-scale biogas plants among other efforts will ensure CO² neutrality by 2013.



TANZANIA

INDIA



SWITZERLAND



POWERING TRUCKS USING ELECTRIC LINES

→ Clean air is a basic human right – in and outside of traffic. Using overhead electrified wires, trucks now can run on electricity on an “eHighway.”

THE SOLUTION

! Hybrid trucks combine the use of diesel engine and electric motor. Combining hybrid trucks with overhead electrical wires on highways, Siemens is able to provide an “eHighway” system that eliminates diesel emissions and noise on heavily travelled stretches of highway or urban routes.

The solution comprises specially equipped hybrid trucks that automatically connect to the overhead electrical lines, after which the truck exclusively runs on electrical power. Upon disconnection, the truck automatically switches to diesel. The widespread adoption of the eHighway would make trucks equipped with an electrical drive system able to connect to the overhead electrical lines regardless of engine type.

WHY A SUSTAINIA100 SOLUTION?

? Due to poor infrastructure and inefficient engines, trucks have for a long time been a major source of smog and toxic chemical pollution linked to cancer and respiratory problems for affected populations. Investing in sustainable solutions that minimize pollutants from traffic provides immediate public health benefits and minimizes dependency on fossil fuels such as diesel.



www.siemens.com



THE GREEN BUSINESS DISTRICT

→ By integrating sustainable design into every step of the building process, this East Asian financial hub is charting a path for modern business districts to follow.

THE SOLUTION

! Large green areas, extensive public transportation, luxurious LEED-certified residential buildings, and 25 kilometers of bike paths are in the Songdo International Business District. The district will, upon its completion in 2015, be the largest private LEED development in the world, housing more than 65,000 residents and 45 million square feet (4,180,500 m2) of office space.

Green areas covering more than 40% of the district will together with rooftop vegetation help reduce stormwater floods and reduce the urban heat island effect during hot summers, making the city less dependent on artificial cooling.

Average apartment prices in Songdo are estimated to be \$500,000, making it a city for those who can afford to pay. Despite this exclusivity, the city does showcase how a modern financial hub can combine luxurious lifestyle with sustainability to attract international investments.

WHY A SUSTAINIA100 SOLUTION?

? With projected investment inflows of \$35 billion, the Songdo International Business District shows how sustainability can be attractive to large financial investments. Moving towards a sustainable society, Songdo proves it is possible to bring onboard the financial sector.



www.songdo.com





E-COMMERCE IS ECO-COMMERCE

→ Digital goods and services make life easier for consumers, and have a positive impact on the environment and economy. Online music is a powerful example.

THE SOLUTION

! E-commerce refers to the digitization of physical goods and services. The music industry is a prime example of an industry that has been revolutionized by the advent of the Internet and modern information and communications technology. Where music used to be sold and distributed in physical form, today it is mostly downloaded or even streamed via online music services. A number of services could be highlighted: Napster paved the way, iTunes made it profitable, and today everyone is talking about streaming sites such as Spotify.



ECONOMIC

Reducing costs and improving productivity has positive effects on the industry as well as the economy.



SOCIAL

E-commerce lets customers shop at their convenience in front of their computer or using their smartphone.

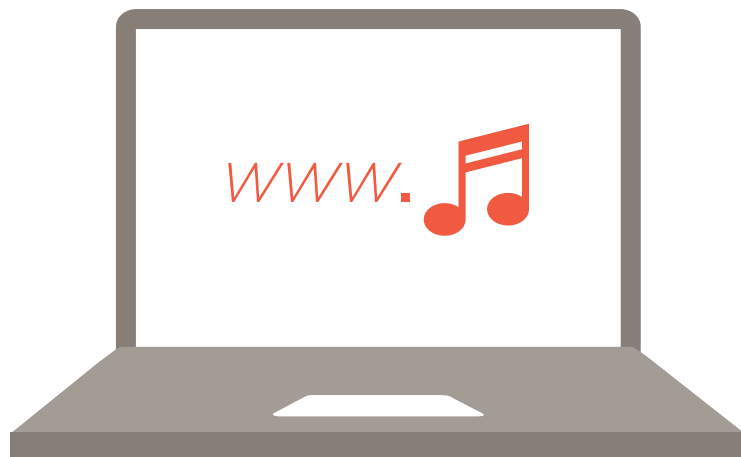


ENVIRONMENTAL

Digitizing the music industry has led to CO₂ emissions reductions estimated at roughly 80%.

1. Weber, Koomey & Matthews (2009). THE ENERGY AND CLIMATE CHANGE IMPACTS OF DIFFERENT MUSIC DELIVERY METHODS.

The estimate cited here refers to avoided emissions related to switching from CDs to downloading digital music.



BUILDING A ZERO-CARBON FACTORY

→ In partnership with the Kingdom of Morocco, Renault and Veolia Environment collaborated to build the world's first zero-carbon and zero-effluent automotive plant.

THE SOLUTION

! Heavy manufacturing is typically an energy- and resource-intensive process. Renault's Tangier automotive plant, which opened in February 2012, is the world's first carbon-free, zero industrial liquid discharge plant. Carbon emissions have been slashed by 98% and water consumption by 70% compared to conventional facilities of similar size.

The thermal energy generation system includes biomass boilers fuelled by sustainably harvested olive pits and eucalyptus wood. Innovative technologies and aggressive energy recovery efforts in the paintshop reduced thermal energy requirements of the plant by 35%. Electricity consumed onsite is 100% renewable, sourced, in part, from wind farms.

WHY A SUSTAINIA100 SOLUTION?

? The project could not have succeeded without the active support of the Government of Morocco and early collaboration between industrial designers at Renault and Veolia. The Tangier plant is not an ambitious proposal but an operating facility, capable of producing 400,000 vehicles annually. The innovative processes developed here can be replicated at automotive factories around the world.



ECONOMIC

The project will be covered by the Clean Development Mechanism (CDM), delivering Certified Emission Reductions (CERs), saleable credits that are included in the business model.



SOCIAL

Veolia developed a job-training program that will place workers for 50 local green jobs.

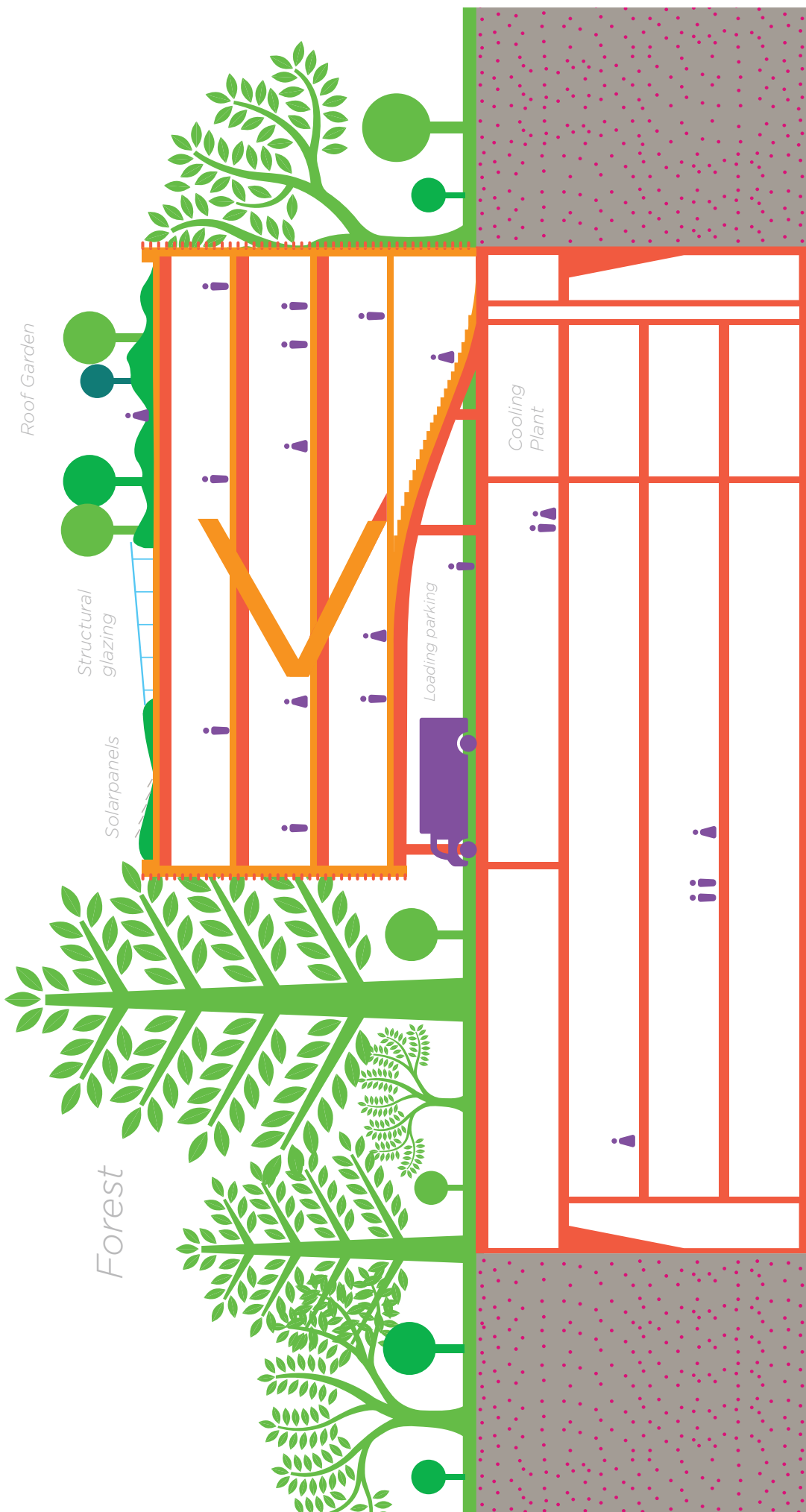


ENVIRONMENTAL

CO₂ emissions have been slashed by 98% compared to conventional factory with the same capacity.



www.veolia.com



OFFICES IN SYMBIOSIS WITH SURROUNDINGS

→ Creating environmentally friendly offices linked to the forest, and an ultra-modern office building in sync with nature.

THE SOLUTION

! Taking a holistic approach to sustainability and sustainable living, the Forest Office in Skolkovo, Russia, represents a concrete proposal on how to create an inspiring workplace in symbiosis with its environment. The Forest Office will be an all-around sustainable complex that puts sustainability measures in every aspect of the building design.

The Forrest Office incorporates a number of environmentally friendly and sustainable solutions such as using waste heat for heating and cooling purposes, wind and solar power, as well as roof gardens.

WHY A SUSTAINIA100 SOLUTION?

? The Forest Office inspires people to do what they do best. As most people spend a major part of their life at work, measures must be taken to ensure and enhance the quality of their life – in this case their working life. Visible sustainable measures and solutions, implemented hand-in-hand with people, promote livability among employees and society.


ECONOMIC
The Forrest Office is to run on cost-effective and renewable energy resources such as wind energy and solar energy.


SOCIAL
An improved quality of life, since people spend roughly one-third of their life at work.


ENVIRONMENTAL
Designed to achieve LEED Platinum certification, the building is "green" and therefore has minimal negative environmental impacts.





RE-USEABLE VENUES

→ The London Olympics utilize a series of temporary venues that could be reused in other locations.



ECONOMIC
The designers delivered a venue for a fraction of the capital cost, which will not require future maintenance or conversion costs.



SOCIAL
The venue can be reused by a new community after the Games.



ENVIRONMENTAL
More than two-thirds of the materials can be reused when re-erected.

THE SOLUTION

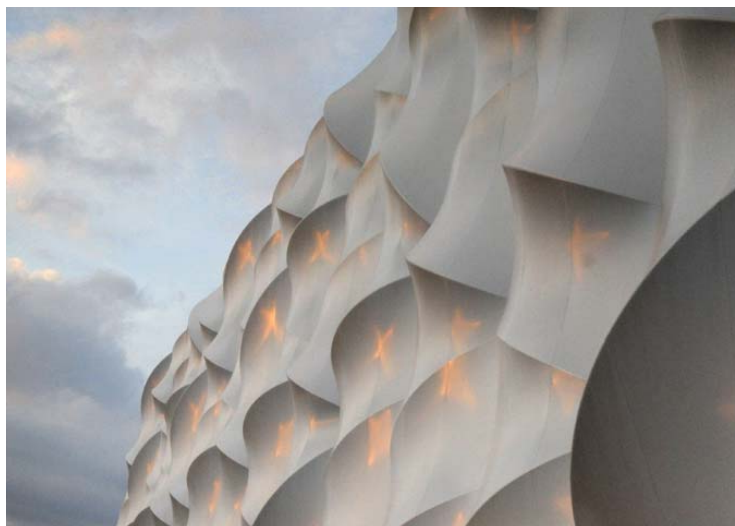
! Delivering a major sporting event requires major capital investment by the host. In the past, these venues have not supported sustainable legacy use. One of the largest temporary structures in Europe, the project involved the construction of a 12,000-seat venue for the 2012 Olympic Basketball Tournament. The building is designed to be a temporary venue. After the Games, two-thirds of the materials and elements of the arena, such as the lightweight steel frame, can be reused or recycled.

WHY A SUSTAINIA100 SOLUTION?

? The Basketball Arena made it possible for the Olympic Delivery Authority to provide a high-quality venue at a fraction of the cost of a permanent facility. The arena can be dismantled and erected in a new location, providing a sustainable solution. It might even be re-used at the 2016 Rio Olympics.



www.barr-construction.co.uk



CLOUD COMPUTING

→ Used to cut costs and improve flexibility, cloud computing slashes energy consumption and causes less pollution.



ECONOMIC
If 80% of the companies in seven EU countries moved data in a cloud space, it would result in \$2.8 billion in reduced energy expenses annually. ¹



SOCIAL
Having your software and files stored in the cloud liberates you from dealing with constant updates or data loss if your computer fails.



ENVIRONMENTAL
By the same estimate as above, 5 million tons of CO2 emissions each year could be avoided - equivalent to the emissions from 2 million cars.

THE SOLUTION

! Cloud computing refers to the idea of storing data, applications, and processing power in "the cloud." The cloud is a data center, which enables you to access information from any computer, anywhere. Some of the more familiar examples are YouTube, Google's suite of online services, and Dropbox.

Familiar to everyone and one of the first examples of a widely used cloud computing solution, Microsoft's Hotmail allowed millions of users to access e-mail from any Internet-connected computer.

As more and more communication is moved online and into the cloud, the need for transportation and distribution of traditional mail is reduced, along with its economic and environmental costs.

WHY A SUSTAINIA100 SOLUTION?

? Think of cloud computing like mass transit. The data center is essentially getting computing applications to carpool or take the bus instead of sitting in their own individual servers. This gives customers the opportunity to use external information technology resources and potentially shut down their existing IT operations, saving energy and money. Taking the idea of E-commerce to the next level, cloud computing eliminates the need for distributed computer capacity, increasing convenience and economics for the user, while reducing environmental impact.

1. "The carbon calculator": www.enablingtechnology.eu/Environment



Many companies make use of cloud computing - check out:
www.violin-memory.com
www.microsoft.com
www.dropbox.com





HEATING FROM DATA CENTERS

→ Data centers account for 2% of the world's CO₂ emissions. The energy lost from data centers can be utilized for other purposes such as space heating.

THE SOLUTION

! Utilizing the energy lost and usually not recovered by data centers, Dalkia is able to supply green energy to a new Val d'Europe business park located near Paris, France. The energy is distributed through a district heating network that offers a real and sustainable alternative to the use of fossils fuels.

The large volume of hot air generated by air-conditioning units in data centers is collected and recovered, where it can be used to supply buildings with green energy.

WHY A SUSTAINIA100 SOLUTION?

? Energy use is a critical issue for data centers, where electricity costs are a dominant operating expense for companies. Collecting the excess hot air usually lost in data centers not only allows companies to cut down on their carbon footprint, it also turns the hot air into a resource rather than a waste by-product.



ECONOMIC

Transforming hot air from waste to a resource improves the economics of the data center.

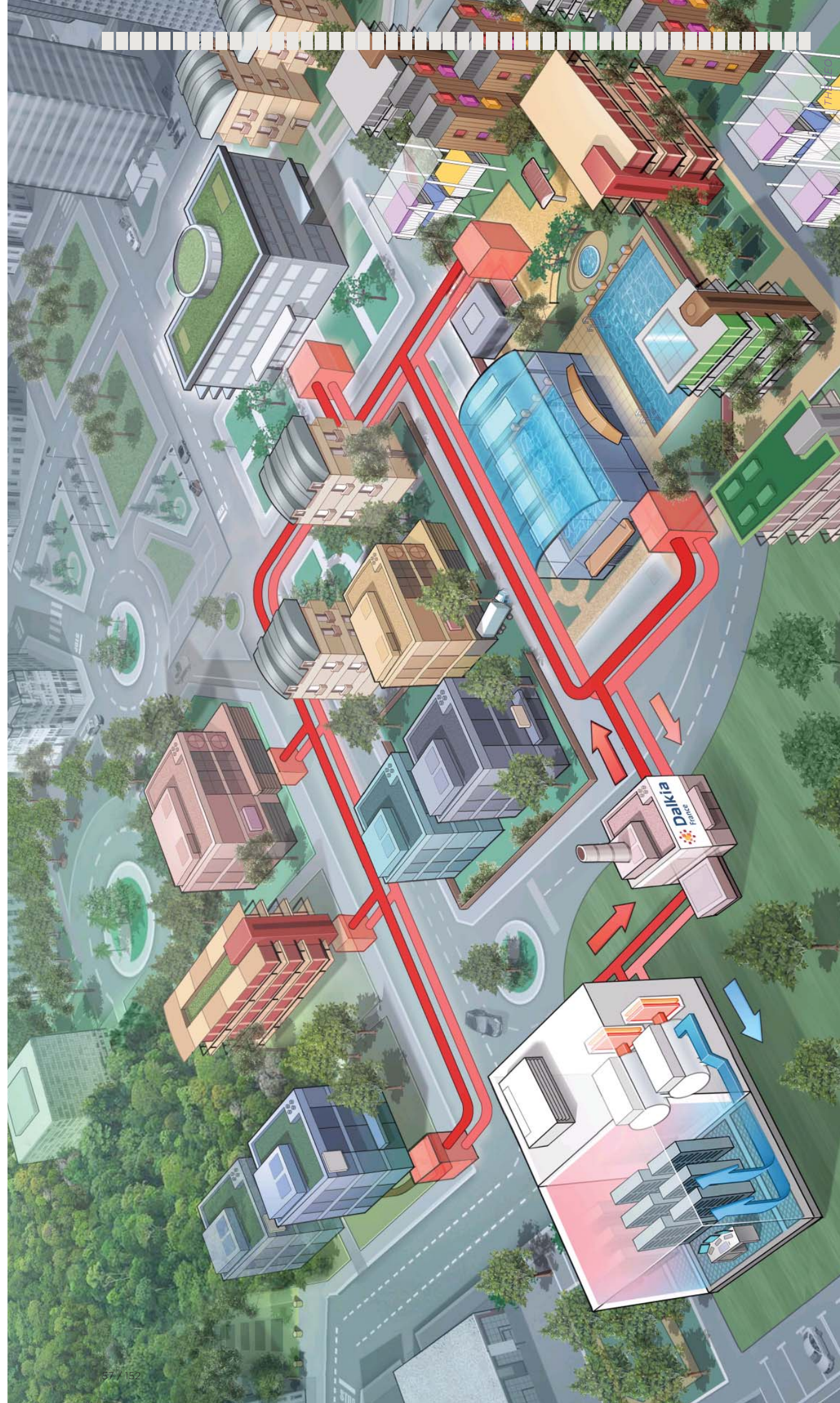


ENVIRONMENTAL

Utilizing waste heat for district heating eliminates the need for fossil-based heat production.



FRANCE





SMART IRRIGATION

→ The right amount of water at the right time. Smart water-management solutions connect your irrigation system to local weather forecasts.

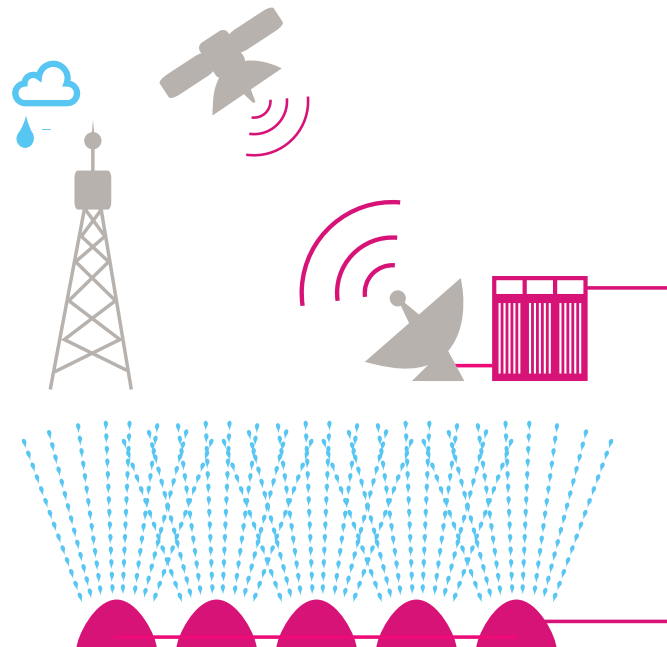
THE SOLUTION

! Using smart technology systems, the WeatherTRAK system provides a resource-efficient method of landscape irrigation. It uses local weather information to put in just the right amount of water in the right place at the right time. This is contrary to conventional irrigation systems that generally overwater, leaving you with high water bills and property damage.

The system draws on information delivered wirelessly from 40,000 weather stations that automatically schedule irrigation based on individual landscape needs and local weather conditions. Wireless sensors monitor and alert property managers to leaks. A smartphone app makes possible remote-control manual irrigation.

WHY A SUSTAINIA100 SOLUTION?

? Irrigation accounts for approximately 70% of water consumption worldwide; irrigated agriculture contributes 40% to total global food production.¹ Poor water-management systems with regards to irrigation increase global water scarcity, which adds to environmental, economic, and social problems. Investing in efficient, smart water-management systems provides a multitude of financial and environmental benefits and reduces the largest source of waste in urban areas: landscape irrigation.



ECONOMIC

Campbell Union School District, California, saved \$ 111,000 in 6 months on their water bills, according to WeatherTrak.



SOCIAL

The system provides water use data for property managers, landscape contractors, and company executives, which educates and creates awareness.



ENVIRONMENTAL

Walmart stores equipped with WeatherTRAK smart irrigation controllers have reduced outdoor water use by 39% on average, according to the companies.

1. <http://www.unwater.org>



www.hydropoint.com



AERODYNAMIC TRUCKING

→ Making semi-trailer trucks more aerodynamic significantly reduces fuel consumption and the environmental impact of the sector.

THE SOLUTION

! With help from the U.S. Department of Energy's supercomputer, a South Carolina company, BMI, was able to simulate airflows around large 18-wheel trucks called semi-trailers. This led to the development of the UnderTray System, a series of wind-deflecting add-ons that improve trucks' aerodynamics.

BMI estimates that installing these wind deflectors on a semi-trailer can boost fuel efficiency of a truck by up to 12%. If the UnderTray System were to be installed on all 1.3 million of America's semi-trailers, the U.S. Department of Energy estimates that it would save 1.5 billion gallons of diesel fuel annually and reduce carbon dioxide emissions by 16.4 million tons.

WHY A SUSTAINIA100 SOLUTION?

? There will always be a need to transport goods from one place to another. According to the U.S. Environmental Protection Agency, the transportation sector in the United States accounts for more than 33 percent of the country's CO2 emissions. The UnderTray not only helps the transportation sector reduce its environmental impact, it also offers companies a significant fuel cost savings.



ECONOMIC

According to the company, at current fuel prices in the United States, the 1.5 billion gallons saved annually generates savings of more than \$5 billion.



ENVIRONMENTAL

The potential reduction in fuel consumption from the transportation sector is estimated to prevent 16.4 million tons of CO₂ emissions annually.



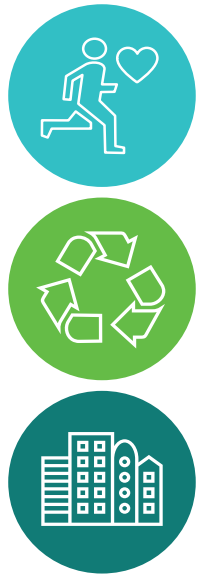
www.smarttrucksystems.com





The Advo- cate

*YOU DO THE
PROJECTS AND
SHARE THE
KNOWLEDGE,
WHILE REMINDING
SOCIETY OF THE
IMPORTANCE OF
SUSTAINABILITY*



SANITIZING WATER USING SUNLIGHT

→ Clean drinking water is a basic human need. Using filters and sunlight, this solution provides clean drinking water, employment, and economic opportunity for rural developing communities.

THE SOLUTION

! Using off-the-shelf filtration and UV-light disinfection, UV Waterworks provides clean drinking water for more than 5 million people in India, Bangladesh, Ghana, and the Philippines. According to UV Waterworks, the sole distributor of this water-purification system, it can provide a decade of healthy drinking water at less than \$10 per person, and exceed WHO standards for quality.

The solution is a modular system comprising a range of filtration, osmosis, and UV filtration technologies. The system is maintained locally, and monitored in real-time for quality control, by UV Waterworks.

WHY A SUSTAINIA100 SOLUTION?

? Clean drinking water is a basic human need. Yet billions of people across the developing world do not have access to it. This technology, patented in the mid-1990s, is widely deployed, already improving the lives of more than 5 million people in India, Bangladesh, Ghana, and the Philippines. A one-time community investment provides immediate health and well-being benefits, as well as employment and profit, as the community retains ownership of the facility.



ECONOMIC

UV Waterworks can provide clean drinking water at less than \$10 per person, while providing employment and profit opportunities for a community.



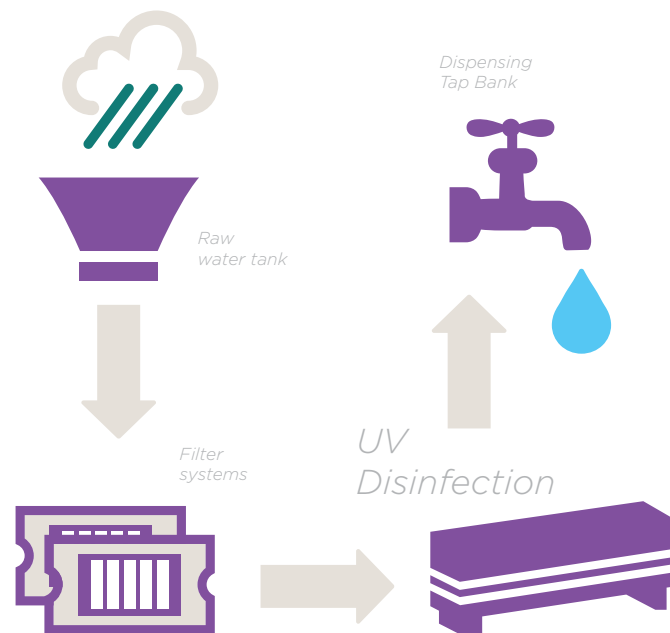
SOCIAL

Roughly 3.75 million people die every year as a result of water-borne diseases.



ENVIRONMENTAL

More than 5 million people have access to clean drinking water via the UV Waterworks system.



www.waterhealth.com



REVITALIZING THE GHETTO

→ Once a ghetto-like neighborhood with chronic flooding problems, a district of Malmo, Sweden has been transformed into a top destination for newcomers to the city.

THE SOLUTION

! Lack of retrofitting, and flooding due to undersized draining, left the Augustenborg district socially challenged by the end of the 1990s. Since then, a green revitalization of the neighborhood transformed it into one of the most popular places to live in Malmo.

Green rooftops, including Scandinavia's first botanical rooftop garden, improve residents' quality of life and ensure 20% less rainwater reaches the streets. A visible system of natural draining (streams and creeks) provides effective protection against floods and serves as the green and blue lungs of the city.

The revitalization process was carried out in close collaboration with residents, resulting in high levels of citizen engagement to the present day.

WHY A SUSTAINIA100 SOLUTION?

? Holistic urban planning emphasizing sustainability and local needs can radically change the appearance and attractiveness of neighborhoods. Sustainability can be a driver of social change, and the experiences from Augustenborg are now being replicated in neighborhoods across Sweden.



ECONOMIC

Augustenborg today is an attractive neighborhood in which the turnover of tenancies has decreased by almost 20%.



SOCIAL

According to the City of Malmo, about 1 of 5 citizens participated in activities related to the revitalization.



ENVIRONMENTAL

Today, Augustenborg is a test-bed for numerous sustainable projects related to solar energy, waste management, electrical trains, and EV carpooling.



Photo: City of Malmö

www.malmo.se/sustainablecity



SUSTAINABLE FORESTRY

→ In Kenya, it is possible to protect forests and biodiversity and pursue sustainable economic development for rural communities at the same time.



ECONOMIC

In Kenya, more than 150,000 people benefit economically from the project.



SOCIAL

Forests provide environmental services like clean water and clean air to most of the world's people.

THE SOLUTION

! The natural forests of the world provide livelihoods to millions of rural people and a home to most of the world's biodiversity. Wildlife Works' forest protection project in the Kasigau Corridor of Kenya engages forest communities positively in the future of their forest resources, protects biodiversity; and, as a result, brings the financial benefits of the global carbon marketplace down to the grassroots.

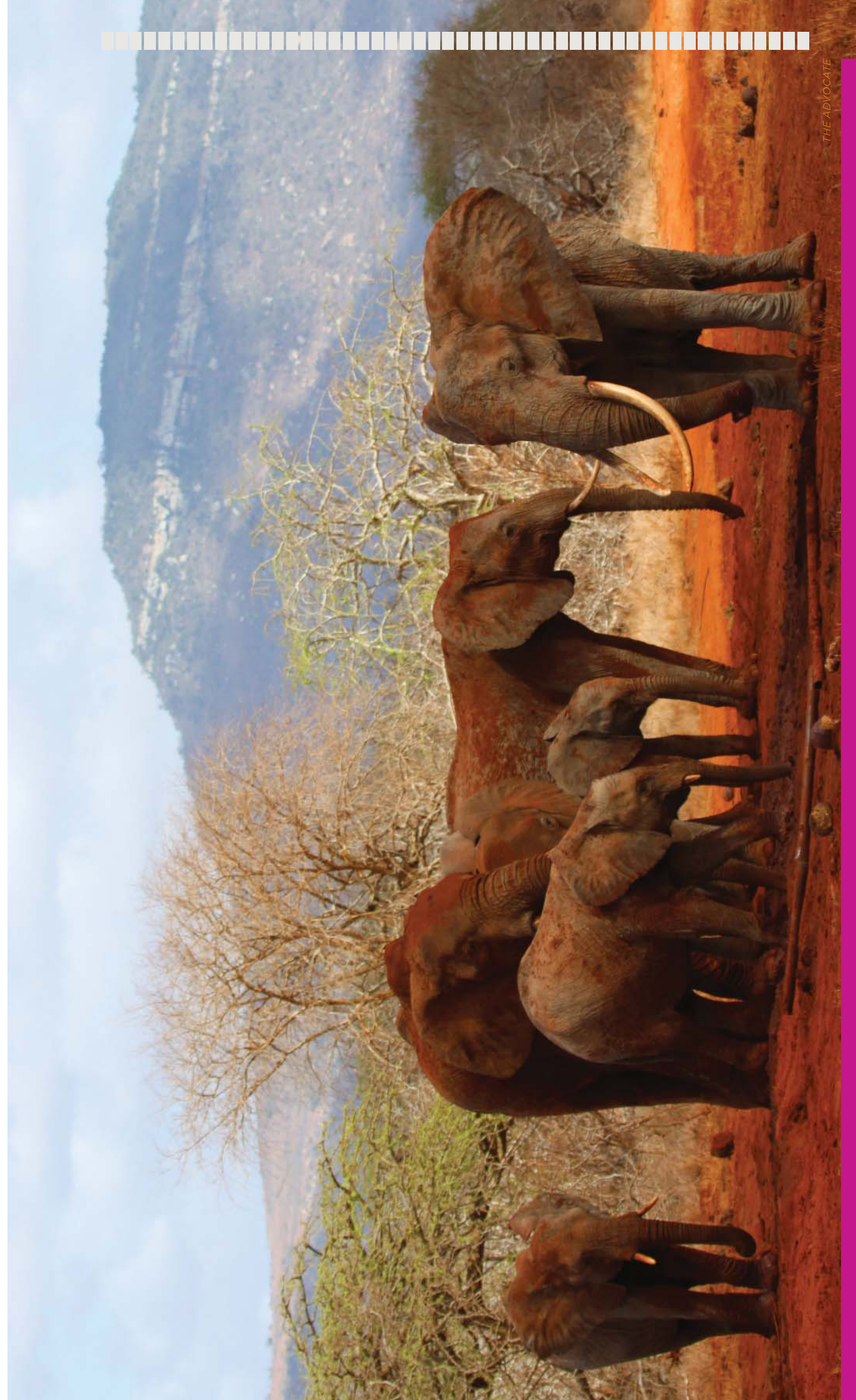
Using the REDD+ mechanism, Wildlife Works has conserved 200,000 hectares of forest and empowered 150,000 rural Kenyans. How do they do it? By channelling the financial benefits associated with preventing emissions from slash-and-burn forest clearing back to communities.

WHY A SUSTAINIA100 SOLUTION?

? Deforestation in rural communities has severe consequences for the climate, poverty, biodiversity, and human rights. Carbon market financing makes the act of forest conservation a resource for local populations. Wildlife Works' approach is scalable, and has shown the potential to set local communities on a path of towards forest-friendly sustainable development.



KENYA





CLEAN COOKSTOVES

→ Reducing indoor pollution, clean cookstoves dramatically improve the health and well-being of those who use them. And they are good for the climate.

THE SOLUTION

! Nearly 3 billion people cook using traditional cookstoves and open indoor fires. Clean cookstoves reduce the amount of local and global pollution resulting from open fires for cooking in the developing world. Fuel and technology neutral, the Global Alliance for Clean Cookstoves promotes a range of clean cooking technologies, which are suited to the needs of the user, are scalable, and meet international standards for performance.

The alliance promotes: clean fuels for cooking, such as biofuels and processed solid fuels; stove technology to improve efficiency and substitute fuels, such as advanced biomass stoves and solar stoves; and behavioural and structural solutions, such as chimneys and outdoor cooking to reduce indoor pollution.

WHY A SUSTAINIA100 SOLUTION?

? Promoting a range of different clean cooking technologies, the Global Alliance for Clean Cookstoves addresses key social, economic, and environmental issues for the nearly 3 billion people of the developing world reliant on traditional cookstoves and open fires to cook.¹



ECONOMIC

Reducing the amount of time spent collecting fuel increases time to work.



SOCIAL

Exposure to smoke from traditional cookstoves and open fires causes 2 million premature deaths annually.²



ENVIRONMENTAL

Cleaner cookstoves will have a substantial impact on the global climate by reducing carbon emissions associated with traditional cookstoves.



Colombia and 19 other countries



Photo: Global Alliance for Clean Cookstoves

1. World Health Organization (2011): "Indoor air pollution and health". www.who.int

2. Ibid.



CATTAILS FOR ENERGY

→ Cattails are wetland plants with near global distribution. Today, they are underappreciated for their carbon and nutrient capture abilities. Harvesting produces bioenergy and improves wetland habitat

THE SOLUTION

! A regional bioeconomy is developing in Manitoba, Canada. The International Institute for Sustainable Development (IISD) and its partners have proven that harvesting and processing into fuel products the fast-growing wetland plant cattail can: produce bioenergy, reduce nutrient loading to waterways, recover high-value phosphorus for fertilizer, produce carbon credits, and improve habitat.

Harvesting occurs at urban and rural locations, including natural wetlands, engineered treatment wetlands, stormwater retention ponds, ditches, urban greenbelts, and marginal agricultural land. The multiple economic streams (energy, phosphorus, and carbon credits are all worth money) make cattail harvesting a cost-effective sustainable development solution.

WHY A SUSTAINIA100 SOLUTION?

? Three of the biggest sustainable development challenges in the world are the need for sustainable energy, clean water, and food security – all of which are supported by this collaborative solution, which is scalable to watersheds worldwide.



ECONOMIC

The IISD has ensured an \$180,000 carbon credit contract for 2012.



SOCIAL

Cattail harvesting offers new revenue streams from marginal lands that boost farm income and increase rural resilience, avoiding the food versus fuel dilemma.



ENVIRONMENTAL

Cattail harvesting removes an average 33 kg of phosphorus per hectare and sequesters up to 6 tons per hectare of carbon



CANADA





RELIABLE AND AFFORDABLE CLEAN WATER

→ One billion people don't have access to clean drinking water. A new water management system makes it possible to provide an affordable and environmentally sustainable water supply to the developing world.



ECONOMIC

The payment system ensures financial integrity and automatic collection of revenue, thereby assuring ongoing delivery of operating funds.



SOCIAL

Lifelink is a community-development project by nature. Reliable access to clean water means a radical improvement in health, livelihood, gender equality, and school attendance.



ENVIRONMENTAL

The system operates using renewable energy sources, primarily solar energy.

THE SOLUTION

! Grundfos Lifelink has developed a water supply and management system based on a scalable business model. It is a turnkey system comprising a solar-driven water pump, a water container, and a dispenser.

The business model is a closed-revenue collection system based on e-money and mobile banking, described by Kenyan users as "a corruption-free environment." An operation and maintenance agreement guarantees service of the system for 10 years.

The result: Nearly 100,000 people now enjoy access to clean drinking water in Kenya.

WHY A SUSTAINIA100 SOLUTION?

? Reliable access to clean water is a foundation of sustainable development. Access to water is the common denominator for solving the major global challenges: energy, food, health, peace and security, and poverty eradication.

The Lifelink system ensures affordability and mechanical and environmental sustainability, while minimizing the risk of corruption. It contributes to creation of green jobs, gender empowerment, community development, and radical improvement of health and well-being.



www.grundfoslifelink.com



ELECTRICITY FOR TRASH

→ In Brazil and Chile, street pickers and poor families are paid in energy credits when recycling, reducing trash and increasing environmental awareness.



ECONOMIC

In Rio de Janeiro, Brazil, energy credits worth \$213,400 have been paid to 71,222 registered customers.



SOCIAL

The program has so far removed 2185 tons of waste from the streets of Rio de Janeiro.



ENVIRONMENTAL

In the State of Ceará, Brazil, 36 communities host 54 waste-collecting stations helping to empower 390,160 low-income households.

THE SOLUTION

! The solution offers access to electricity for low-income populations, while promoting recycling. The business model of Ecoendesa is simple. Customers are issued a card. They separate recyclables from trash and gather material for recycling. An operator notes the type and weight of the material delivered, and calculates the amount of credit. Based on the current value of the recyclable materials, energy credits are turned into discounts on the customers' electricity bills.

The characteristics of this model have the potential to be transferred easily to other settings. Ecoendesa currently offers programs in Santiago, Chile, and several Brazilian states. In Mexico City, a similar solution, Mercado de Trueque, offers fresh food in exchange for recyclable materials.

WHY A SUSTAINIA100 SOLUTION?

? Ecoendesa incorporates the three dimensions of sustainability by using financial incentives to encourage the collection and recycling of waste with an aim to reduce poverty. Increasing urbanization in developing countries, and pressure on the world's resources, underlines the importance and scalability of this solution across cities in emerging economies.¹

1. IBM Institute for Business Value, A vision of smarter cities.



www.enel.com

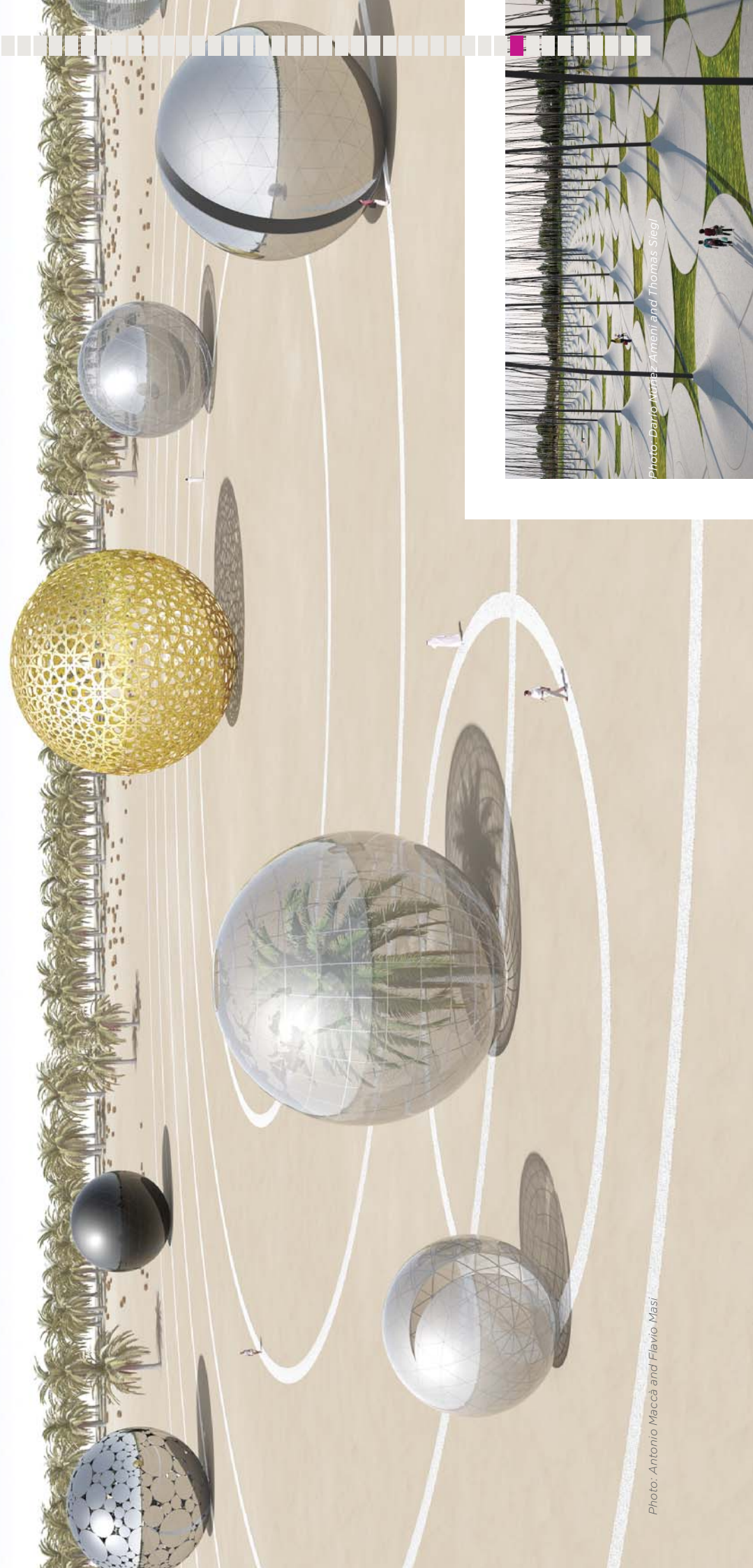


Photo: Antonio Maccà and Flavio Masi



Photo: Darío Vera, Ament and Thomas Siegl



ESTHETICS OF RENEWABLES

→ Interdisciplinary collaboration, and involvement of artists in the building process, can increase popular acceptance of clean energy infrastructure.

THE SOLUTION

! Resistance to wind or solar power installations often takes refuge in arguments that hinge on questions of esthetics. The Land Art Generator Initiative (LAGI) is responding to the challenge of public acceptance by creating public art installations that provide clean power to thousands of homes while serving as objects of city beautification.


Through interdisciplinary design competitions and educational outreach, LAGI provides esthetic and pragmatic solutions for the 21st-century energy crisis while showing cities around the world the multi-faceted benefits that come from combining energy infrastructure with public art.

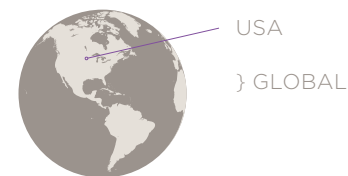
WHY A SUSTAINIA100 SOLUTION?

? The Land Art Generator Initiative incorporates ready and available technologies as the medium for collaborative public art design projects. They have the ability to transform the way in which the world conceives of renewable energy infrastructure. The project provides real return on investment in megawatt-hours of clean energy for the utility grid and sustainable economic development.


ECONOMIC
 According to LAGI, their art installations are financed by increased tourism and economic development that support business in cities.


SOCIAL
 LAGI has reached millions of people in more than 40 countries.


ENVIRONMENTAL
 LAGI public art installations minimize impact on the natural environment and safely generate pollution-free electricity for the grid.





SUSTAINABLE COOKING FUELS

→ An integrated sustainable business model provides sustainable cooking fuels, reduces deforestation, and improves health.

THE SOLUTION

! CleanStar Mozambique (CSM) is pioneering a new, sustainable business model that improves the environment and human lives. Thousands of smallholder farmers in the Sofala province will transition from charcoal production and slash-and-burn agriculture to cultivating a diverse range of crops and trees, significantly improving their income and nutrition levels while rehabilitating degraded soils and enhancing biodiversity.


Whatever the families do not consume themselves, they can sell to CSM. The company operates a local food and ethanol cooking fuel production facility. It also produces a range of food products, as well as an ethanol-based cooking fuel made from cassava. These products, and clean-burning ethanol cook stoves, will be sold into urban markets.

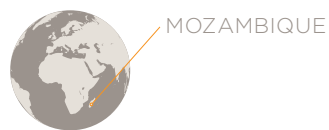
WHY A SUSTAINIA100 SOLUTION?

? CSM reduces deforestation and greenhouse gas emissions by replacing charcoal with competitively priced, sustainably produced ethanol cooking fuel. It improves access to affordable and clean energy for urban families. It increases both agricultural yields for smallholder farmers and household income by up to 500% compared to today, where charcoal production is the primary source of revenue.


ECONOMIC
CSM increases rural incomes by at least 300% (2,000 families by 2014).


SOCIAL
CSM reduces respiratory disease and deaths caused by indoor air pollution from burning charcoal.


ENVIRONMENTAL
CSM reduces deforestation (4,000 ha per year by 2014), restores depleted soils (5,000 ha by 2014), and adds new trees (over 2 million by 2014).



SCHOOLS COMPETE TO SAVE RESOURCES

→ Campus Conservation Nationals motivates over 200,000 students to reduce resource consumption. The national goal in 2012 was to save 1 gigawatt-hour of electricity. Final result: 1.7

THE SOLUTION


! The schools compete to reach the largest water and energy reductions in residence halls. They can choose to compete against buildings on their own campus, in a regional or state competition, or against a select group of institutions.

The Campus Conservation Nationals aims to foster a culture of conservation and to engage, educate, and empower students to conserve resources in their residences. The participating schools can instantly follow and compare performance online, share winning strategies, and track standings among the leading buildings and schools.

WHY A SUSTAINIA100 SOLUTION?

? Changing behavior of building occupants is an important component of conservation and sustainability. The competition offers many educational opportunities, such as enabling students to teach themselves conservation behaviors, as well as environmental and economic benefits.

Campus Conservation Nationals is designed to empower the future generation of energy and environmental leaders, and foster a culture of conservation within campus communities.


ECONOMIC
Students contribute to measurable reductions in electricity and water use.


SOCIAL
Students learn conservation behaviors that can be employed in the home and workplace in the future.


ENVIRONMENTAL
The water savings of the 2012 competition: 10,365 shower hours.





SUSTAINABLE LIVELIHOODS IN FORESTS

→ A Thai forest protection project helps former wildlife poachers and illegal loggers become organic mushroom farmers via market-based incentives.



ECONOMIC

Participating families earn an average of \$215 to \$300 monthly, enabling them to invest in expanding their business, and, in many cases, send their children to school.



SOCIAL

According to the Freeland Foundation, their approach is shown to reduce poaching by over 70% in nearby forests.



ENVIRONMENTAL

Southeast Asia stands to lose over 40% of its animal and plant species if the root causes of poaching and illegal logging are not addressed.

THE SOLUTION

! The Freeland Foundation helps economically disadvantaged rural families in Thailand take up organic mushroom farming as an alternative to poaching wildlife and illegal logging. The project provides agricultural training, and start-up and marketing support, in exchange for a commitment to protect forests and wildlife. Most importantly, it gives conservation a market value by connecting growers with consumers who want organic products that help protect wildlife and natural ecosystems.

Southeast Asia desperately needs a model for propagating sustainable livelihoods and community forest stewardship. This scalable solution can help save the region's remaining forests, alleviate rural poverty, and protect endangered species. It also contributes directly to increased food security.

WHY A SUSTAINIA100 SOLUTION?

? Mushrooms are a nutritious high-margin crop with a low environmental footprint. Demand for organic produce is growing rapidly in Asia. This solution empowers local communities to generate a sustainable income from organic farming by meeting the demands of environmentally conscious urban consumers. Multiple inter-province and international study tours have been hosted to share the approach with community leaders, farmers, development workers, and protected area managers across Thailand and Asia.



THAILAND

www.freeland.org



RETROFITTING ALLEVIATES ENERGY POVERTY

→ Using a pragmatic and cost-effective approach to retrofitting homes, a UK program is able to help residents reduce carbon emissions and save money.



ECONOMIC

Pilot studies reveal a reduction in annual energy bills of 18% to 29%.¹



SOCIAL

Retrofitted homes are safer and more comfortable, which adds to the homeowners' quality of life.



ENVIRONMENTAL

The essence of retrofitting or refurbishing homes is to reduce energy consumption.

THE SOLUTION

! By implementing low-cost and sensible refurbishments in existing homes, "Relish" – Residents 4 Low-Impact Sustainable Homes – works with residents to show them how their lifestyles can reduce household energy bills.

Based on pilot projects, Relish has shown how small changes can accumulate to noticeable energy reductions and financial savings, and that reduction in energy use is achievable through refurbishment, education, or both.

The program offers advice on sustainable solutions, designed around sensible measures that reduce energy use and improve livability for homeowners.

WHY A SUSTAINIA100 SOLUTION?

? Improved quality of life and sustainable living go hand-in-hand with each other. Since homes account for a large part of energy usage in society, retrofitting existing homes can take us much closer to a sustainable future. Since lifestyle and habits play a significant role in the energy use at home, education and pilot studies are hugely important when seeking to drive change among consumers.

1. Relish 2011: Lessons learned and outcomes of phase 1



UNITED KINGDOM

www.relish.org





MONITOR EUROPE'S ENVIRONMENT

→ What was once very complicated and inaccessible is now made available for people to understand and provide feedback through their phones and mobile devices.



SOCIAL

EOE lets individuals track water and air quality before deciding, for instance, which beach to visit or city to move to.



ENVIRONMENTAL

Information precedes action. EOE helps build a solid base for individual as well as collective environmental action.

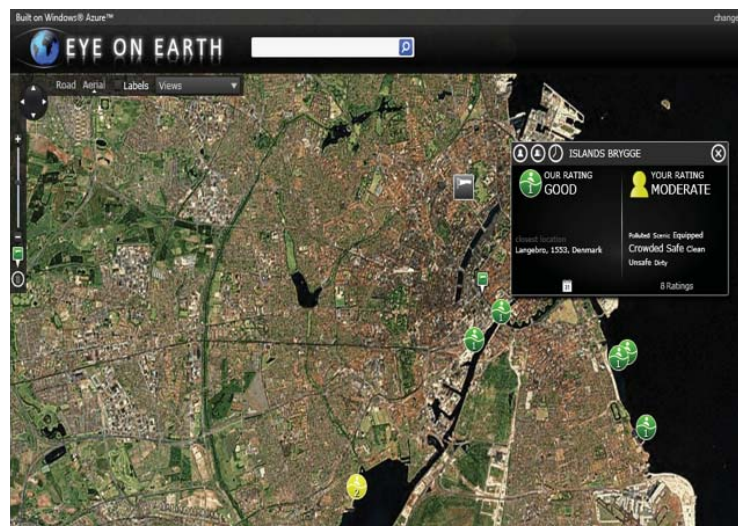
THE SOLUTION

! Recent technology innovations have accelerated the democratization of the Earth's data for citizens in Europe and around the world. The Eye On Earth (EOE) platform was created by the European Environment Agency, Esri, and Microsoft. This innovative, easy-to-use, and open Web tool allows users to compare, share, and rate air and water quality across Europe.

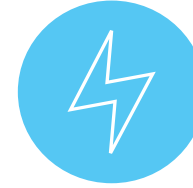
EOE retrieves data from over 20,000 monitoring points across Europe, presenting quality ratings across 32 countries in 24 languages. It uses a 'traffic light'-style evaluation of air and water quality based on traditional monitoring methods: this is supported by ratings reflecting the experiences of local people in the area. It provides accurate and up-to-date information on environmental and cleanliness indicators across Europe, and makes it available to anyone who has Internet access.

WHY A SUSTAINIA100 SOLUTION?

? Pollution released into the atmosphere and bathing water cleanliness can be significant public health issues. EOE is open to any person to build similar sites for free, using different comparative data sets. Combining environmental data and mapping technology enables people to see where changes are happening, and take appropriate actions to help ensure a more sustainable future.



www.network.eyearth.org



STUDENT-DRIVEN TECHNOLOGY TRANSFER

→ Engineering students build wind turbines in small communities in Nicaragua. Not only that, they also teach science and technology, and inspire students to develop renewable technologies.



SOCIAL

An integral part of the project is educational outreach in science, technology, engineering, and mathematics.



ENVIRONMENTAL

Providing renewable energy to rural areas in developing countries.

THE SOLUTION

! After realizing the potential of renewable energy, and the fact that one-quarter of the Earth's population live without electricity, a group of young engineering students at the University of Minnesota decided to find new solutions. In 2009, they started in their professor's basement. Soon, the group of "Innovative Engineers" expanded. By 2012, it has 150 members working passionately in the developing world to develop imaginative and creative ways to design and implement renewable energy technologies.

Their newest project, 5-5-1, consists of designing and developing five wind turbines in five nearby villages to create one renewable energy community. All aspects of 5-5-1 are shaped around one central idea: to understand how the knowledge behind a simple low-cost wind turbine design can be successfully transferred across cultural, economic, and language boundaries.

WHY A SUSTAINIA100 SOLUTION?

? For many citizens in developing countries, electric power is not an option. This project not only solves a problem, it also educates people to make use of renewable energy, and to find new ways to utilize simple technology. It is the group's philosophy to make a positive impact through education and outreach.



www.cse.umn.edu





ELECTRIFICATION LEADS DEVELOPMENT

→ Access and use of electricity in rural Brazil has proven to increase quality of life, while strongly improving the economic situation in poverty-afflicted areas.

THE SOLUTION

! The Luz Para Todos (Light for All) program is working to ensure access to electricity to homes in rural areas in Brazil. In 2003, 80% of the population in some areas lacked access to electricity. By improving the quality of the existing electricity service, and intensifying the service pace, the program has expanded the electricity grid to 11 million people.¹

Further extension of the power grid has proven difficult in remote Amazon areas. But through citizen involvement, Luz Para Todos is now setting up decentralized renewable energy systems in the thinly populated Amazon areas. By providing the information and the equipment necessary to install these renewable energy sources, an additional 1 million will soon gain energy access.

WHY A SUSTAINIA100 SOLUTION?

? Rural families are now able to use home appliances and electric-powered rural equipment, which raises incomes and strengthens human resources in communities. The program has also increased the clean water supply and improved sanitation services in the served areas.



ECONOMIC

Luz Para Todos has contributed to approximately 300,000 direct and indirect jobs.



SOCIAL

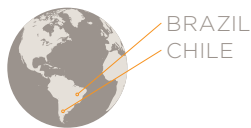
Access to electricity in rural areas facilitated poverty reduction, improved health, and increased incomes for the 2.5 million families involved.



ENVIRONMENTAL

Solar- and biogas-powered systems are installed in homes, reducing greenhouse gas emissions.

1. UNGC (2011): A Global Compact for Sustainable Energy.



BRAZIL
CHILE



SUSTAINABILITY AT UNIVERSITIES

→ Nearly 700 educational institutions across the USA agree that higher education has a responsibility to help society achieve a more sustainable future.

THE SOLUTION

! “The American College & University Presidents’ Climate Commitment” (ACUPCC) works to create sustainability and climate awareness in higher education. Signatories have committed to initiate the development of comprehensive plans to achieve climate neutrality as soon as possible. To inspire action, a reporting system allows institutions to show off their efforts while disseminating solutions.

The presidents and chancellors of the 677 colleges and universities are deeply concerned about the unprecedented scale and speed of global warming, and its potential for large-scale, adverse health, social, economic, and ecological effects. Every year, the ACUPCC Climate Leadership Summit facilitates discussions of milestones and provides opportunities to meet key decision-makers at peer institutions and collaborate on ways to advance sustainability efforts on campuses.

WHY A SUSTAINIA100 SOLUTION?

? The ACUPCC facilitates knowledge-sharing and innovative efforts in higher education, and it pushes for more courses on sustainability. Sustainable education precedes the sustainable society. The ACUPCC represents a move towards incorporating sustainability in curricula across the world.



ECONOMIC

According to the ACUPCC reporting system, 99 signatories implemented projects that generated total savings of \$100 million dollars.



SOCIAL

On-campus renewable energy sources at 134 campuses are producing a total of 170 GWh/yr.




ENVIRONMENTAL

The commitment represents one-third of the U.S. student population, more than 6 million people.



CANADA
USA





The Engi- neer

*YOU DESIGN AND
BRING TO LIFE
THE SUSTAINABLE
TECHNOLOGY
OF TOMORROW*



TURNING WASTE INTO ENERGY

→ Household and industrial waste is a resource, which can be utilized for energy generation in various forms. Oslo leads the way.

THE SOLUTION

! The Haraldrud and Klemetsrud waste-to-energy plants take waste from households and companies to generate electricity and heat for the city of Oslo. As of 2013, expansions will enable the plants to receive 410,000 tons of waste/yr, from which 840 GWh of heat and 160 GWh of electricity is produced. This corresponds to the energy use of 84,000 households.

Oslo's Agency for Waste Management commissions private companies to collect, via biogas-fuelled trucks, waste and take it to sorting facilities. The refuse is separated into reusable waste, waste for biogas and fertilizer production, and waste for incineration, which generates electricity and heat.

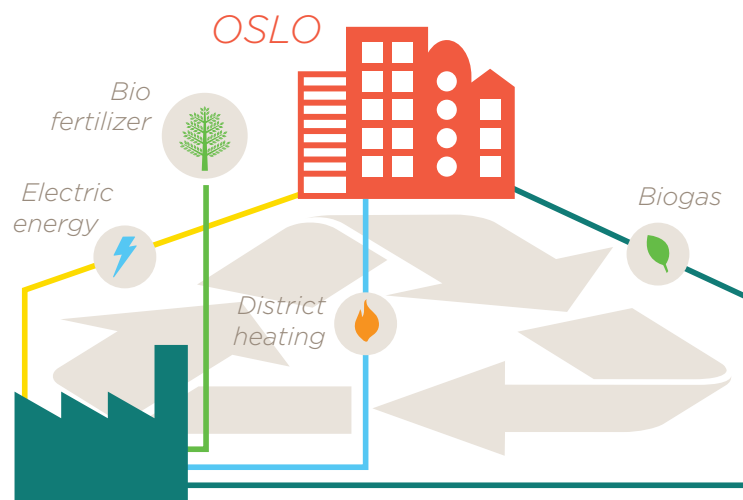
WHY A SUSTAINIA100 SOLUTION?

? Turning waste into energy saves city money and reduces its environmental impact, while providing an efficient waste management solution for its citizens. Cities across the world including, Copenhagen, Manchester, and Tokyo have similar schemes.

ECONOMIC
Turning waste into energy means that value is created from your trash.

SOCIAL
The expansion of waste-fuelled district heating in Oslo has led to an overall improvement of its air quality to the benefit of everyone living in Oslo.

ENVIRONMENTAL
The energy produced from Oslo's waste is equivalent to 100,000 tons of oil/yr.



www.energigjenvinningsetaten.oslo.kommune.no



HALF A GRID OF WIND

→ The electricity grid needs to be able to handle large amounts of renewable energy. This solution demonstrates the ability of the Danish island of Bornholm's energy system to handle a large share of wind energy.

THE SOLUTION

! Using smart technology, EcoGrid EU demonstrates the capacity of the electricity grid to handle more than 50% electricity coming from renewable energy sources. The central idea of the EcoGrid EU is the introduction of market-based mechanisms to release balancing capacity, particularly from flexible consumption.

Approximately 2,000 residential consumers (out of a total of 28,000 customers) participate in this Smart Grid demonstration project, with flexible demand response tied to real-time price signals.

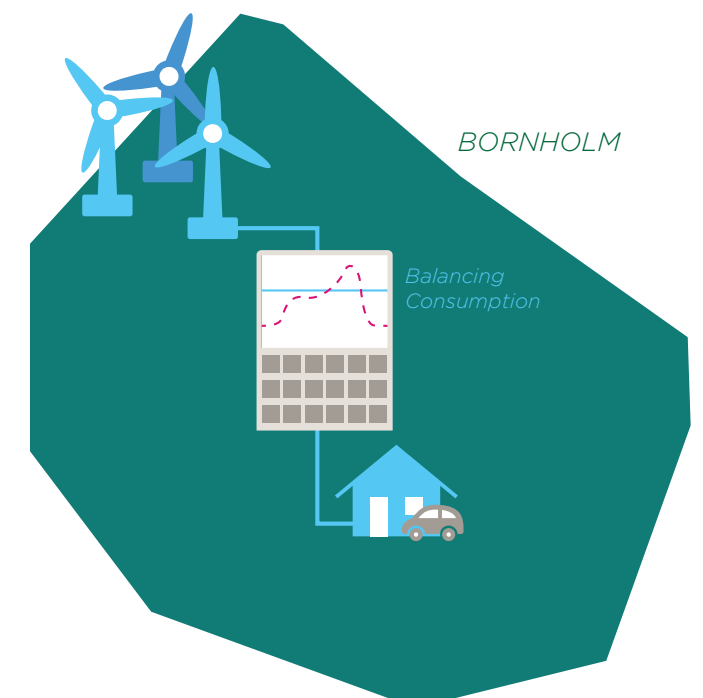
WHY A SUSTAINIA100 SOLUTION?

? Integrating large amounts of renewable energy from wind and solar farms poses significant challenges to the electricity grid as we know it. Raising eyebrows all over Europe for its ability to handle large amounts of fluctuating renewable energy in its system, the EcoGrid project of Bornholm is a demonstration of the future of energy grids. The size of the project, and the amount of fluctuating renewables integrated, make the project particularly noteworthy.

ECONOMIC
Higher shares of home-grown renewable energy insulate countries from price shocks in global energy markets.

SOCIAL
The EcoGrid EU project empowers consumers with regard to their energy consumption.

ENVIRONMENTAL
Half of the energy supplied through the EcoGrid EU project is based on renewable energy sources.



www.eu-ecogrid.net



MAKING USE OF WASTE METHANE

→ Landfills and mines across the world release methane gases. These emissions can be utilized as a new energy source – providing electricity, heat and mitigating climate change at the same time.



ECONOMIC

Green Gas currently generates electricity and heat for approximately 400,000 households.



ENVIRONMENTAL

According to Green Gas, the emissions neutralized by its plants are equivalent to the emissions of over half a million cars. Methane is a far more potent greenhouse gas than carbon dioxide.

THE SOLUTION

! Methane gases released from mining operations and landfills pose a serious threat to our climate. Dutch-based Green Gas International provides a solution for collecting these gases and producing energy from them instead.

In the case of coal mines, three methods of gas extraction are combined: gas drained directly from the seams before mining, gas drained from gas horizons affected by the mining process, and gas collected from voids left behind after mining. After collection, the gas can be used for combined heat and power (CHP) generation. Green Gas International has installed more than 200 of these plants, with a combined capacity of more than 150 MW.

WHY A SUSTAINIA100 SOLUTION?

? Currently operating in Europe and the Americas, the Green Gas approach can be expanded to developing countries, thereby turning waste gases into useful energy for electricity and heat. Though we should conserve resources, and recycle as many of them as possible in the sustainable society, mines and landfills will remain a part of the sustainable future. Optimizing the resource use of these activities, and reducing their environmental impact, makes this a sustainable solution.



www.greengas.net



CARS AS A BATTERY FOR THE GRID

→ Advancements in vehicle-to-grid (V2G) systems make for a better usage of resources.

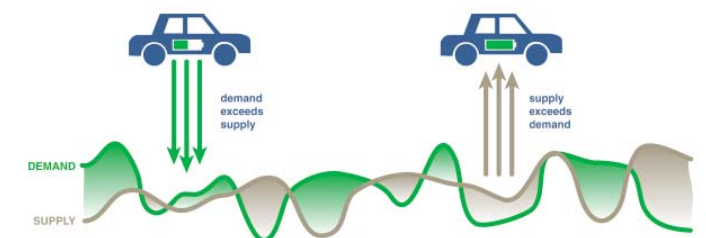
THE SOLUTION

! American start-up Nuvve enables electric vehicles to offer power capacity to the grid and generate revenue for the EV owner. Turning the fantasies of grid operators into reality, this solution effectively provides distributed energy storage to the electricity grid. But it also reduces the net cost of electric vehicles, still one of the biggest hurdles to their wider adoption.

Cars are parked nearly 95% of the time. This solution connects electric vehicles to a grid operator. When needed, energy stored in a vehicle's battery pack is sold to the grid. The EV owner makes a profit, and the grid operator is able to maintain stability and absorb higher rates of fluctuating renewable energy into the grid. Nuvve's V2G solution can integrate electric vehicles into the existing grid and help energy distribution companies reduce their required upgrade costs.

WHY A SUSTAINIA100 SOLUTION?

? An electrical vehicle that runs on renewable energy such as wind or solar power is a true zero-emission vehicle. Moreover, leveraging the available battery capacity of a parked EV conserves resources, offers financial benefits for the vehicle owner, and provides stability to the energy system.



ECONOMIC

According to Nuvve, an EV owner can earn up to \$10,000 over the life of the car by providing vehicle-to-grid services.



SOCIAL

In the United Kingdom, air pollution, primarily from vehicle emissions, is estimated to cause 24,000 premature deaths annually.¹



ENVIRONMENTAL

Nuvve's technology enables storage of surplus electricity from fluctuating renewable energy sources such as wind and solar power.



1. BBC, "Health: Exhaust emissions": www.bbc.co.uk

www.nuvve.com



HYBRID SHIPS



→ A Prius for the sea? Researchers in Norway have developed a hybrid energy system for merchant ships that couples a fuel cell with advanced batteries, saving fuel and reducing emissions.

THE SOLUTION


! If hybrid energy systems can improve the fuel efficiency of cars such as the Toyota Prius, why can they not do the same for merchant ships? The Norway-based FellowSHIP project, an R&D collaboration between DNV, Wartsila, and Eidesvik, is demonstrating the use of a fuel cell integrated with a battery pack aboard the Viking Lady.

First, the ship was equipped with a 330-kW fuel cell – the first large-scale fuel installed on a merchant ship. Later, in another first, researchers will test how the system performs when partnered with batteries. The Viking Lady will be outfitted with a 500-kWh battery pack capable of producing 5MW over short periods. At commercial scale, the hybrid energy system would likely include a 2-3-MWh battery pack.

Researchers expect the full-scale installation to reduce CO₂ emissions by up to 50 pct. and boost fuel efficiency by up to 30% over conventional maritime propulsion systems.

WHY A SUSTAINIA100 SOLUTION?

? Commercial shipping is one of the fastest-growing sources of carbon emissions. The FellowSHIP maritime hybrid energy system, pairing a fuel cell with batteries, can reduce emissions by up to 50%.


ECONOMIC
Should boost confidence in fuel cell and battery technology among investors, ship owners, and policymakers, and allow ship owners to hedge against increasing fuel costs.


SOCIAL
Significant reduction of air pollutants will improve public health for populations living in proximity to ports.


ENVIRONMENTAL
Potential to slash CO₂ emissions by half and eliminate NO_x, SO_x, and particulates.



NORWAY



WASTE WATER TO ENERGY

→ Clean water is an essential resource for a good life. Turning to energy-efficient wastewater treatment methods can help fight water scarcity and provide clean energy.

THE SOLUTION

! Lynetten, the water treatment plant in Copenhagen, cleans sludge and wastewater from private, public, and industrial institutions, and provide clean water to about 1 million people. The sludge is converted into biogas, supplying energy to over 3,000 households.

The technology used at Lynetten enables wastewater to be recycled and re-used as energy. Sludge is incinerated to supply energy for district heating and electricity.

WHY A SUSTAINIA100 SOLUTION?

? Water is a scarce resource not just because of geography and climate but because of a lack of proper wastewater treatment systems. Fresh water is wasted, polluted, and not managed sustainably. Efficient wastewater treatment systems allow for wastewater and sludge to be recycled as much as possible. Lynetten has cleaned the previously heavily polluted harbor in Copenhagen to such a level that it is now fit for swimming.



ECONOMIC

Lynetten supplies about 30% of the gas used in the city gas system in Copenhagen.



SOCIAL

Clean water allows people to swim in Copenhagen Harbor, creating an urban sanctuary in summer.



ENVIRONMENTAL

Waste-to-energy is a stable, long-term energy resource.



www.lyn-is.dk



BULK ENERGY STORAGE

→ Bulk energy storage makes it possible to integrate more renewable energy into the grid while increasing efficiency and stability.

THE SOLUTION

! Bulk energy storage is one of several solutions in this guide whose primary attraction is its ability to enable higher shares of renewable energy into the energy system. Because solar and wind energy is intermittent, we need ways to compensate for that fluctuation. Energy storage is one way to do just that.

The most common technology is pumped-storage hydropower (PSH) – 99% of global bulk storage capacity – whereby water is pumped into a reservoir when excess electricity is available and released for power generation when needed. However, geography imposes limits on further expansions of PSH.

Different technologies are competing on cost and environmental sustainability as demand for bulk storage grows. The only one in commercial operation is compressed air energy storage. Washington-based General Compression is currently building a 2-MW compressed air energy storage facility in Texas.¹

WHY A SUSTAINIA100 SOLUTION?

? Bulk energy storage enables integration of large amounts of renewable energy and increases the overall efficiency and security of the electricity grid. This benefits the consumer in terms of lower prices and less blackouts, and it benefits society with less pollution from fossil fuels and increased overall efficiency.



ECONOMIC

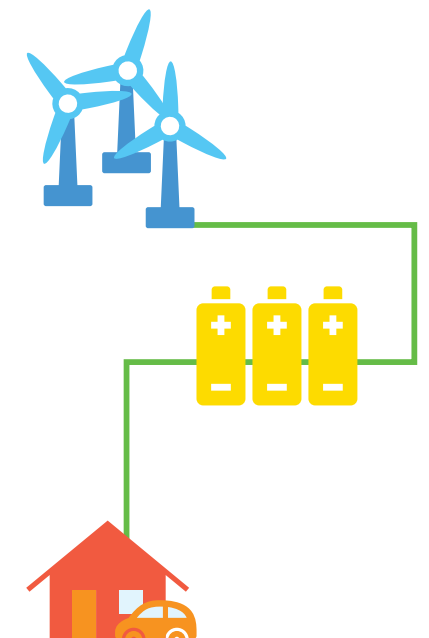
According to Pike Research, the market for energy storage will receive a capital injection of \$122 billion over the next decade.



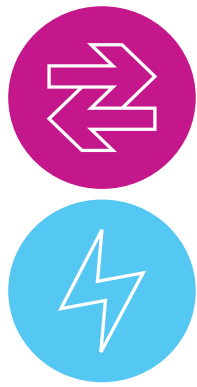
ENVIRONMENTAL

Enabling further expansion of renewable energy capacity reduces pollution from fossil fuels.

1. The economist (2012): "Energy storage: packing some power"



www.generalcompression.com



ENERGY FROM PULP AND PAPER WASTE

→ A new waste-to-energy method is being used by pulp and paper mills to tap the potential of an energy-rich papermaking by-product. Black liquor gasification can produce low-carbon biofuels.

THE SOLUTION

! Pulp and paper mills have traditionally used black liquor – a by-product of paper pulping that contains lignin – as a fuel to power their operations. Swedish firm Chemrec has pioneered the development of black liquor gasification. Black liquor is fed into a pressurized gasifier; the resulting energy-rich syngas can be burned in a gas turbine to power the mill, or converted into chemicals or low-carbon biofuels such as methanol or dimethyl ether (DME).

Under the BioDME project Chemrec and its partners (Volvo, Preem, Total, Haldor Topsoe, Delphi, and ETC) have demonstrated a complete biofuel supply chain. Beginning in 2011, Chemrec's pilot plant, located in Pitea, Sweden, began synthesizing DME. A test vehicle fleet has now logged 450,000 kilometres running on the low-carbon biofuel.

WHY A SUSTAINIA100 SOLUTION?

? Black liquor gasification is a proven concept, available now to transform pulp and paper mills around the world into bio-refineries. The process produces low-carbon biofuels while avoiding the food versus fuel debate that holds back competing forms of biofuel production.



ECONOMIC

By enabling pulp and paper mills to become bio-refineries, black liquor gasification opens up a new revenue stream for mills.



ENVIRONMENTAL

Reduces the carbon footprint of transportation fuels by greater than 90% compared to petroleum-based fuels.



www.chemrec.se



ELECTRIC VEHICLE BATTERIES

→ Electric vehicles face challenges in terms of range and battery durability. Improvements in battery technology aim to address these limitations.

THE SOLUTION

! Touted as the green future of transportation, electric vehicle sales are growing. Boston Power, a technology start-up focused on lithium-ion batteries, intends to make electric vehicles more durable and improve their range by improving the quality of the batteries they employ. Boston Power delivers batteries for small city cars and mid-size sedans, taxi fleets and light-commercial vehicles (delivery vans), and full-size electrical buses and German luxury cars.

One of many suppliers of advanced batteries, Boston Power is notable for its focus on high energy density and strict safety features.

WHY A SUSTAINIA100 SOLUTION?

? Utilizing energy from renewable resources such as the sun and the wind to power electrical vehicles offers immediate benefits, including health and environmental benefits. But in order to deliver on the promises of sustainable transportation, headway needs to be made in battery technology. Boston Power is one of many companies looking to do just that.



ECONOMIC

Powering electric vehicles from renewable energy resources will decrease the dependency on finite and costly fossil fuels.



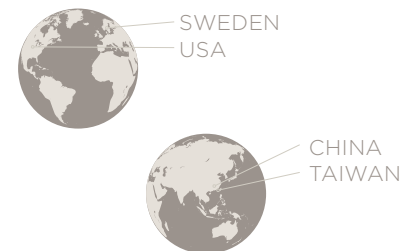
SOCIAL

Electric vehicles decrease noise and local air pollution.

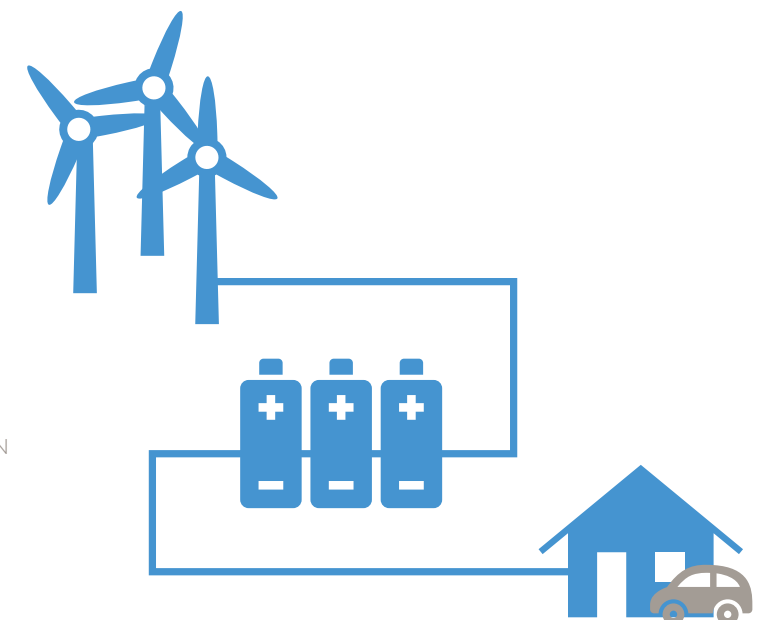


ENVIRONMENTAL

Batteries sold by Boston Power come with stringent international accreditations for environmental sustainability such as the Nordic and Chinese eco-labels.



www.boston-power.com





FLYING ON RENEWABLE BIOFUELS

→ Plant-based biofuels can displace imported oil and reduce emissions compared to more carbon-intensive traditional fuels. It can even be used to make sustainable jet fuels.

THE SOLUTION

! Solazyme produces renewable fuels by harnessing the oil-producing capabilities of microalgae. The company pioneered the first sugar-to-oil bridge, enabling it to convert low-cost plant sugars into renewable oils within a few days. The process utilizes standard industrial fermentation equipment, and is feedstock flexible – sugarcane-based sucrose, corn-based dextrose, and woody plants are all suitable source material.

Solazyme has successfully tested its renewable jet fuel, Solajet, in partnership with the U.S. Navy and United Airlines. On November 7, 2011, a United Airlines Eco-skies Boeing 737-800 was fuelled by 40% Solajet on the first-ever U.S. commercial flight powered by advanced biofuels. Solazyme sold the fuel to United Airlines at current aviation fuel prices. Solajet required no modifications to the plane or engine, and its performance proved indistinguishable from petroleum-based jet fuel.

WHY A SUSTAINIA100 SOLUTION?

? The world's continued dependence on conventional oils is not sustainable. Solazyme's renewable biofuels promise to help countries transition from these traditional fuels. Solazyme has enlisted high-profile partners, including the U.S. Navy and United Airlines, in an effort to drive down production costs and hasten commercialization.



www.solazyme.com



DEMANDING CONTROL IN THE GRID

→ Enabling consumers to respond to fluctuations in electricity supply is one of the primary ways to integrate more renewable energy into the grid.

THE SOLUTION

! The coming smart power grid will reverse the relationship between supply and demand in the power system. Where electricity production (supply) used to respond to demand from consumers, the smart power grid of the future will enable consumers to respond to fluctuations in supply of electricity generated from renewable sources.

DNV KEMA Energy & Sustainability's PowerMatching City project demonstrates the ability of consumers to be active players in the energy system by providing them with demand response capabilities. Heat, for example, is produced for the building with heat pumps when very cheap electricity is available, and then stored for later use. At the same time, consumers generate their own electricity with photovoltaic solar panels and micro combined heat and power units. In addition, they are able to exchange energy with each other on a local energy market.

WHY A SUSTAINIA100 SOLUTION?

? Enabling demand response in the grid is one of the primary ways to integrate higher amounts of renewable energy into the system. When demand for energy becomes flexible, intermittent renewable energy becomes more competitive, as the need for storage, grid interconnection, or backup capacity is reduced.



www.kema.com



MUSHROOM-BASED INSULATION

→ Rigid board insulation is a superior insulator, but is often made from petrochemicals. Building materials made from agricultural byproducts and mycelium offer an oil-free alternative.



ECONOMIC

Ecovative's products use plant material with limited or no economic value, opening up a potential new revenue stream for local farmers.



ENVIRONMENTAL

Ecovative building materials contain low or no VOCs and don't require toxic adhesives that contain formaldehyde.

THE SOLUTION

! Ecovative Design, based in New York State, says it doesn't manufacture its products; it grows them. It starts with agricultural byproducts such as unwanted plant stalks and seed husks, which it inoculates with mycelium, a fungal network of threadlike cells. For about a week, the mycelium grows indoors, without need for light, water, or petrochemical inputs, to fill the shape of a mold. The end results are building materials such as insulation, structural insulating panels (SIPs), and acoustic tiles.

In Ecovative's SIPs, its insulation is wedged between wood panels; the mycelium bonds itself to the wood without need of toxic adhesives. In most SIPs, the foam insulation board is made from more energy- and carbon-intensive petrochemical feed stocks. At the end of its life, Ecovative's biodegradable building materials can be composted.

WHY A SUSTAINIA100 SOLUTION?

? Ecovative's mushroom-based insulation and SIPs will offer builders an alternative to petroleum-based synthetic foam panels. Its products are 100% renewable, using locally available agricultural byproducts as a feed stock.



www.ecovatedesign.com



RECYCLING BATTERIES

→ Many of today's necessities require batteries, which means that demand for battery recycling is soaring. Recycling technology is getting increasingly more sophisticated in expectation of a near future electric vehicle boom.



ECONOMIC

According to the U.S. EPA, more than 3 billion dry-cell batteries are bought in the United States every year.



ENVIRONMENTAL

The objective is to match the positive environmental impact of recycling with its economical and strategic benefits.

THE SOLUTION

! Increased use of portable communication devices makes battery recycling ever more important. Tossed in the trash, batteries harm the environment, while valuable and scarce metals such as lithium are wasted. It is estimated that just 20% of the batteries available for recycling in the United States are actually recycled. As demands for EVs rise, it is expected that lithium will gain value, making large-scale battery recycling more profitable and commonplace.¹

French recycler Recupyl uses modern separation techniques to protect product constituents and allows the recycling of sophisticated chemical compounds with high recycling efficiency. Mechanical and hydrometallurgical processes make possible the extraction and transformation of strategic metals.

WHY A SUSTAINIA100 SOLUTION?

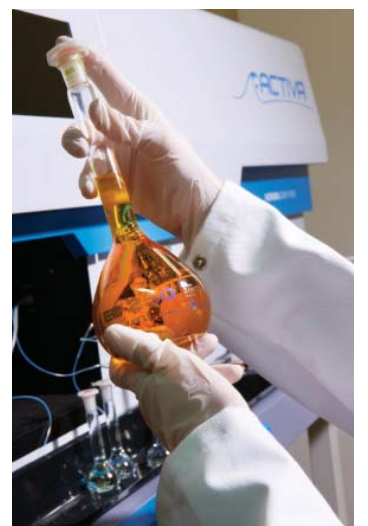
? If transportation is to be made sustainable, deployment of cleaner transportation options, such as a substantially larger EV fleet, is pivotal. Recupyl's recycling provides a solution that is but one puzzle piece in the difficult effort to electrify transportation, while also protecting scarce and finite resources.



FRANCE
POLAND
SPAIN
USA
SINGAPORE

www.recupyl.com

1. Thomas Goonan (2012): Lithium use in batteries - U.S. Geological Survey.





SOLAR COOLING

→ When the summer sun is shining, cooling demand is usually peaking. This makes solar thermal energy for air-conditioning a particularly effective solution in a warm climate.



ECONOMIC

SOLID's solar thermal systems are delivered as an energy service; the client only pays for the delivered energy. According to the company, net yearly savings for UWCSEA are approximately \$675,000.



ENVIRONMENTAL

This UWCSEA project resulted in avoided CO2 emissions of about 389 tons per year.

THE SOLUTION

! The United World College of South East Asia (UWCSEA), in Singapore, has installed the world's largest solar thermal cooling system. Solar collectors covering 3,900 m² were installed atop three sports facilities. These collectors convert light spectrum (shortwave radiation) into heat, harness the heat energy (in the form of hot water) to power the lithium-bromide absorption chiller (cooling machine), and prepare hot water for domestic purposes.

A cooling capacity of at least 1,575 kW is designed to complement the conventional chilling system during daylight hours and help shave peak demand costs significantly. The solar system is estimated to help cool an office space of 20,000 m² over a period of 6 to 8 hours depending on available sunlight.

WHY A SUSTAINIA100 SOLUTION?

? The solar cooling plant, designed and built by the Austrian company SOLID, is a showcase for demonstrating the high potential of large solar thermal systems. In warm climate zones, this solution could greatly reduce energy consumption at times of peak demand.



SINGAPORE

www.solid.at



FARMING WITH LESS WATER

→ Farming accounts for roughly 70% of human water consumption. Using more effective farming technologies, especially in arid regions, farmers can use much less water than they do today.



ECONOMIC

According to Agrice!, Film Farming is expected to offer farmers a return on investment between 40% and 70%.



ENVIRONMENTAL

Film Farming decreases water consumption by 50-90%, increases yields by 50% to 57%.

THE SOLUTION

! Film Farming, where plants are cultivated on a hydro-membrane composed of water-soluble polymer and hydrogel, is a revolutionary new way of farming. Film Farming eliminates 90% of the water, and up to 80% of the fertilizer, used in farming. It boosts the production of nutritious and healthy food.

Film Farming systems are easy to set up, and can be installed on any surface, making the product attractive for farmers in remote and arid regions of the world. The cost-effectiveness of this solution will most likely depend on local climatic conditions.

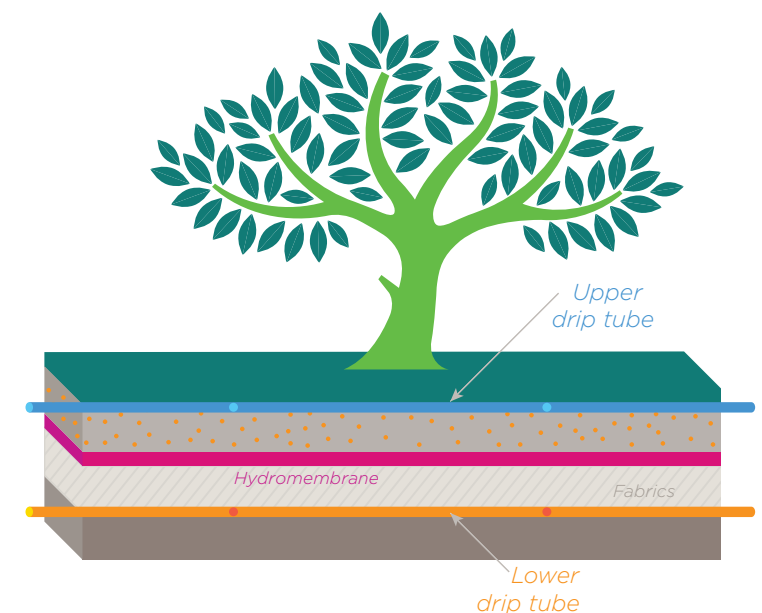
WHY A SUSTAINIA100 SOLUTION?

? By 2030, the demand for water and energy is predicted to rise by 40%; demand for food is expected to rise by 50%. Film Farming represents one solution to a challenge that will be increasingly relevant as climate change effects are felt.



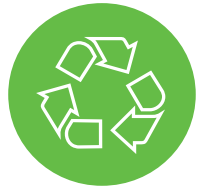
UNITED ARAB EMIRATES

www.agricel.co





ZERO EMISSIONS DATA CENTER



→ A new data center runs on renewable energy and is naturally cooled by Iceland's cold climate.

THE SOLUTION

! Location, location, location! Running your data center in a cold climate on renewable energy makes a world of difference. Data centers consume huge amounts of energy and as more and more services and communication go online, the demand for data center computing power increases steadily. Locating your data center in a climate, where it can be naturally cooled and supplied with renewable energy makes business and environmental sense.

Verne Global operates a zero emissions data center – designed and delivered by Colt – situated in Iceland for its cold climate and abundance of renewable geothermal and hydro-electricity. According to Verne Global, its data center is 100% powered by renewable energy and 100% cooled by the natural environment of Iceland, making the use of chillers and compressors redundant.



ECONOMIC

cheap, reliable power and natural sources of cooling all translate to cost reductions for Verne and its customers.



ENVIRONMENTAL

Aside from using renewable energy and less of it, the center is built with steel rather than concrete, making the materials reusable at the end of its life.

1. Koomey, J. (2011): "GROWTH IN DATA CENTER ELECTRICITY USE 2005 TO 2010". Stanford University. www.analyticspress.com



ICELAND



www.switchautomation.com



A GREEN CONTAINER SHIP



→ Commercial shipping is a large contributor of air pollution accounting for 3-4% of man-made CO2 emissions worldwide. Larger ships, optimised for lower speeds and able to carry more cargo, can slash fuel.

THE SOLUTION

! In 2011, Maersk Line secured an order to build 20 container ships bigger than anything currently at sea. The company's solution, the Triple-E (the "E" is for economy of scale, energy efficiency, and environmentally improved), established a new class of container ship. The capacity of each ship is to be 16% greater than the largest ship built thus far.

The ships are to be outfitted with currently available energy-saving and pollution-control technologies. For instance, the ships' hulls are optimised for lower speeds. An energy-efficient engine will be supplemented by a waste-heat recovery system that contributes to the ship's propulsion. The Triple E class will also be equipped with an energy-efficient ballast water treatment system, and made ready for eventual installation of a SOx scrubber. A "Cradle to Cradle Passport" ensures that when a Triple E ship reaches retirement its components can be safely disassembled and recycled.



ECONOMIC

Packing more containers onto a single ship creates economies of scale that reduce costs and save fuel.



ENVIRONMENTAL

Triple-E ships are designed to reduce CO2 emissions by up to 50% per container, compared to the industry average.

WHY A SUSTAINIA100 SOLUTION?

? Climate policymakers agree that concerted action must be taken to address maritime emissions. The Triple-E class is proof that shipping can be made more sustainable, cost-efficiently, using today's technology.



DENMARK



www.worldslargestship.com



The Venture Capitalist

*YOU THINK
AHEAD AND
LOOK FOR GOOD
INVESTMENT
OPPORTUNITIES
WITH A UNIQUE
SUSTAINABLE
POTENTIAL*



SUPER-CONDUCTORS

→ Superconductors transform the way we transmit and distribute electricity - with applications from high-speed trains to electricity transmission and storage.



ECONOMIC

Uniting separate energy markets with interconnection capacity increases overall efficiency of the grid, which reduces electricity prices for consumers.



SOCIAL

Increased interconnection capacity reduces the risk of blackouts.



ENVIRONMENTAL

Low or zero transmission losses makes possible large-scale renewable energy projects further away from demand centers.

THE SOLUTION

! The challenge of increasing electricity demand, an aging electricity infrastructure, and denser urban environments calls for a transformation of the grid. Complementary to smart grid solutions, superconductors can transform the way we transmit and distribute electricity.

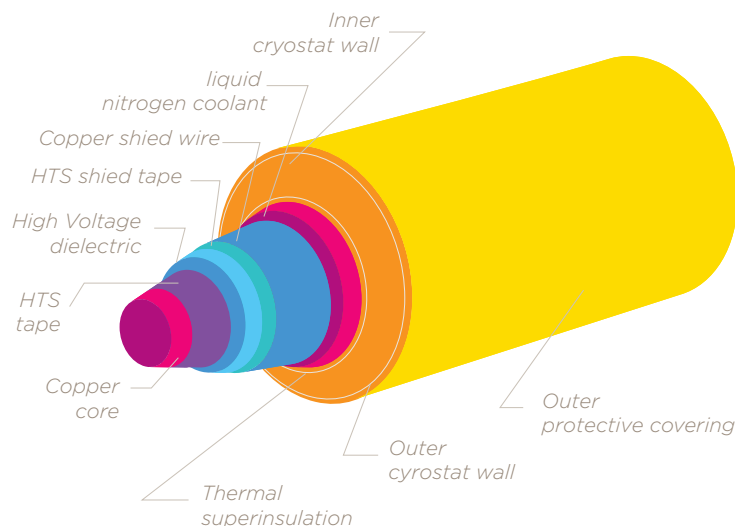
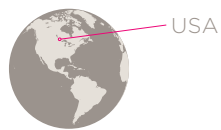
A water pipe is a useful metaphor for understanding how our electricity grid works. The size of the pipe determines how much water can flow through it, and, if the pipe leaks, water is lost in transmission. In much the same way, the electricity grid has physical limits on the amount of current that can travel through it, and resistance causes electricity to be lost in transmission. Superconductivity is the ability of certain materials to exhibit zero (in theory) or very low (in practice) resistance.¹

The Tres Amigas project intends to unite the United States' electricity grid using superconductor technology in order to realize the potential for renewable energy production.

WHY A SUSTAINIA100 SOLUTION?

? As prices for superconductors continue to fall, the idea of connecting large-scale offshore wind farms or solar plants in the world's deserts with faraway urban consumption centers becomes viable. As such, superconductors can enable large-scale integration of renewable electricity in our energy system.

1. Waterloo Global Science Initiative (2012): "Equinox Blueprint: Energy 2030."



Source: Waterloo Global Science Initiative (2012): "Equinox Blueprint: Energy 2030"

www.tresamigasllc.com



GEO THERMAL POWER



ECONOMIC

Worldwide geothermal electricity generating capacity has doubled over the past 10 years.¹



ENVIRONMENTAL

The life-cycle greenhouse gas emissions of geothermal energy are 17 times lower than for coal.²

→ Imagine the energy potential of the sweltering cauldron that is the inner Earth. Today, geothermal energy is one of the main sources of the power coming out of the sockets in Kenya.

THE SOLUTION

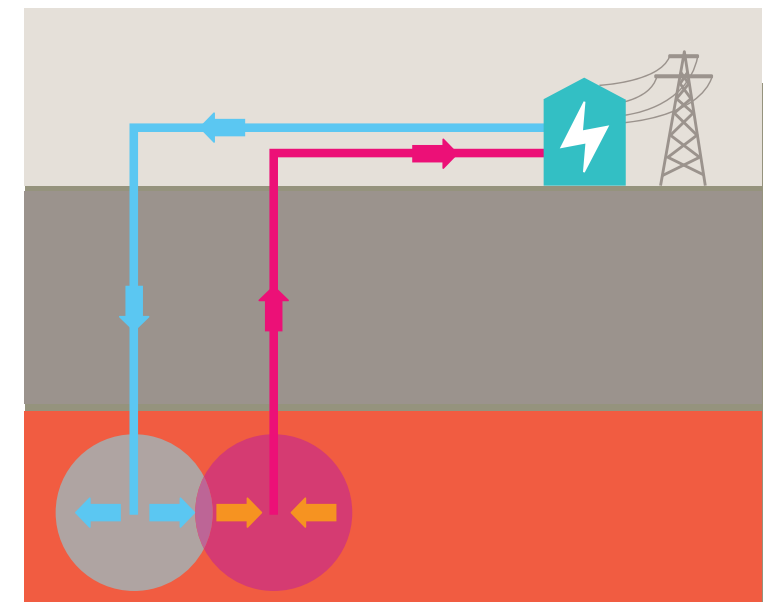
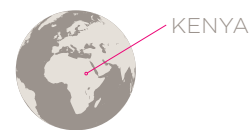
! Expansion plans for Kenya's KenGen Olkaria geothermal plants, owned and operated by Kenya Electricity Generating Company, will make them one of the primary electricity providers in Kenya, and earn them a place among the global leaders of geothermal electricity production, with a combined capacity of 740 MW according to the company - roughly equivalent to a third of the capacity required to supply Rio de Janeiro with electricity.

Geothermal power plants work by extracting energy from the core of the earth. Water is injected into a well and extracted via another. At surface level, the resulting steam is used to produce electricity. The result: environmentally friendly generation of renewable electricity.

WHY A SUSTAINIA100 SOLUTION?

? Having existed for more than 100 years, the technology is ready and available. The theoretical potential of geothermal energy is large enough to cover all of humanity's energy needs. The challenge lies in mapping the geological heat potential in unexploited areas, determining if these areas have economically recoverable heat potential, and weighing production costs against competing energy technologies.

1. www.geothermal-energy.org/
2. Based on Life cycle assessment reviews conducted by the U.S. National Renewable Energy Laboratory, <http://www.nrel.gov>.



www.kengen.co.ke



THERMAL IMAGING OF BUILDINGS

→ New technology ensures universal access to thermal images of buildings. The result: reduced energy consumption by connecting people with the information they need to make smart decisions.

THE SOLUTION

! The MIT-developed start-up Essess captures thermal images of buildings in a drive-by format. In 2012, the pace has been 1 million houses per month, with 5 million houses captured as of May. The data is analyzed to detect and analyze energy leaks in buildings, and is presented via a platform that allows customers to print reports for their individual buildings.

The company hopes to slash prices for thermal images due to economics of scale and automatically generated reports. The technology allows for an unprecedented amount of data on energy efficiency in buildings, which could be sold to building owners or energy service companies to deliver energy savings.

WHY A SUSTAINIA100 SOLUTION?

? In order to build sustainable societies, we must learn to utilize our energy sources in a more efficient way. This solution helps visualize building energy inefficiencies at scale, which gives buildings owners and nations a quantitative view of energy wasted.



ECONOMIC

Economies of scale allow Essess to sell thermal images at a price considerably under the current market level.



SOCIAL

Upgrades that improve energy efficiency increase comfort while lowering energy bills.



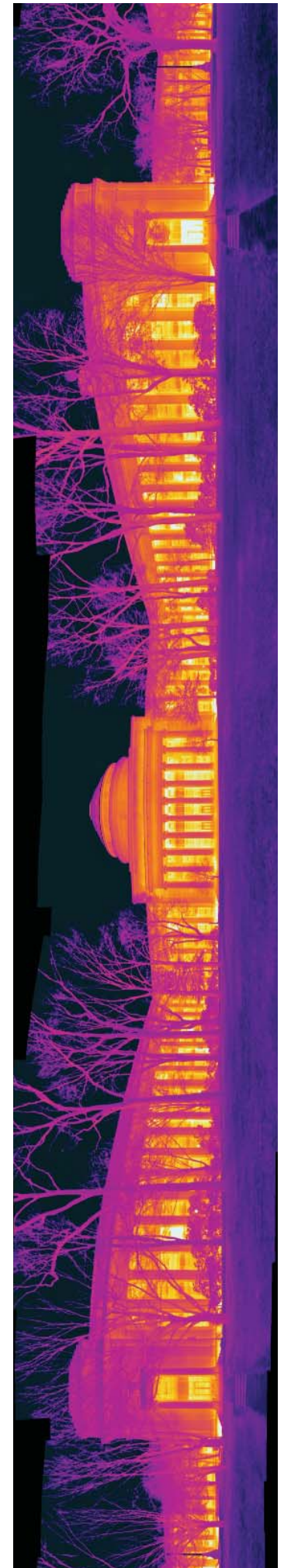
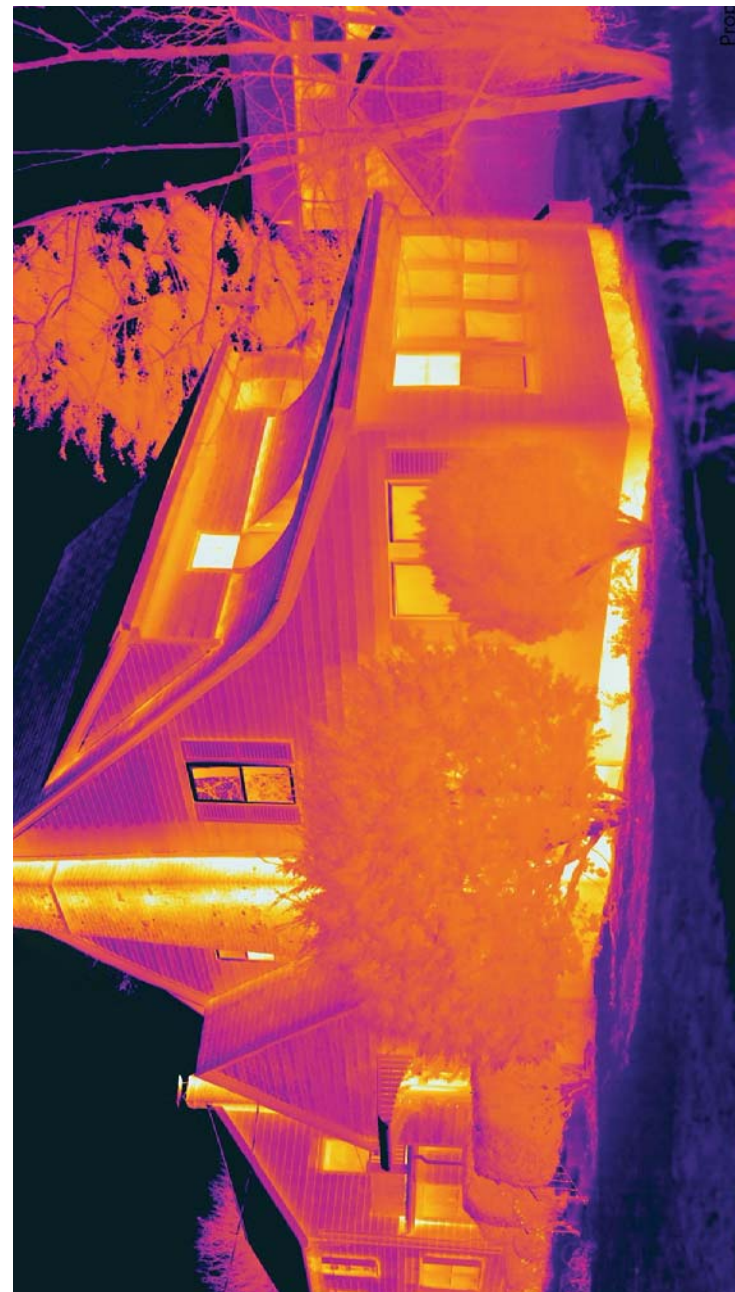
ENVIRONMENTAL

A more energy-efficient buildings sector will result in considerably less energy use and reduced carbon emissions.



USA

www.essess.com





SOLAR HEATING FOR SMALL COMMUNITIES

→ In small communities, district heating coupled with large-scale solar heating and seasonal storage is a cost-effective solution.

THE SOLUTION

! Marstal Fjernvarme, the customer-owned district heating company on the island Aero, Denmark, is a pioneer in developing large-scale solar space and water heating. Supported by grants, the company installed 18,000 m² of ground-mounted solar, proving that this technology is competitive with oil boilers without taxes and ongoing subsidies. Moreover, the company was the first to test underground hot water seasonal pit storage (15,000 m³), and is investing to expand capacity. When expansion is completed, 55% of the annual production of hot water will be generated from solar heat.

The success of Marstal has inspired numerous small district heating companies to do the same. An example is the customer-owned company in Gram, which will use a 41,000-m² solar heating plant and 110,000 m³ of pit storage to bring the share of solar heating up to 56%.

WHY A SUSTAINIA100 SOLUTION?

? District heating is an opportunity for small communities to use solar heat in a cost-effective way. Many small communities have no other obvious opportunities for efficient use of sustainable energy.



ECONOMIC

Solar district heating on Aero and in Gram is being developed on commercial terms.



SOCIAL

Having a visible large-scale solar heating plant creates awareness among consumers that they own the plant, that their energy is renewable, and that conventional fuel not purchased will reduce their heating bills.



ENVIRONMENTAL

The environmental impact of using the renewable sources, via district heating, is much lower than it would be with individual solutions.



DENMARK

www.solarmarstal.dk



ESCO: FINANCING ENERGY SAVINGS

→ Energy service companies offer a way to spread energy efficiency measures throughout the economy - at no net cost.

THE SOLUTION

! Providing the necessary expertise, Siemens ESCO assists companies and governments in implementing cost-effective energy efficiency measures. And the kicker: improvements are paid for by the energy savings guaranteed by Siemens ESCO, resulting in net savings for the customer and profits for Siemens ESCO.

Examples of successful energy optimization projects completed by Siemens ESCO include the UniCredit Group in Milan; City of Berlin; YangPu District Government Administration Bureau, in Shanghai; and Arlanda Airport, in Sweden.

WHY A SUSTAINIA100 SOLUTION?

? Buildings consume 40% of the world's energy. Implementing cost-effective efficiency improvements saves the customer money and alleviates pressure on global energy supplies. Holistic approaches to energy optimization are essential to reduce dependency on fossil fuels and other limited resources. Energy service companies like Siemens ESCO deliver the know-how and the guaranteed savings making it possible to finance projects without upfront investment by the client.



ECONOMIC

The costs to complete the energy optimization project are financed by guaranteed energy savings, resulting in net savings for the customer.



SOCIAL

Upgraded lighting and HVAC systems improve the quality of life for building occupants.



ENVIRONMENTAL

Implementing energy-efficient solutions reduces energy consumption and thus environmental impact.



GERMANY

www.siemens.com





FINANCING LARGE-SCALE RENEWABLES



ECONOMIC

In the last decade (2001-2011), offshore wind in Europe has developed from a curiosity to a market, increasing installed capacity from 4 MW to 866 MW.¹



ENVIRONMENTAL

DONG's electricity production from wind power and water increased to 4.4 TWh, taking the total share from 20% in 2010 to 22% in 2011. That is the equivalent of 1.1 million households' electricity consumption.

→ A unique partnership model contributes to developing the offshore wind industry - this innovative financing model solves a key issue holding back further development of renewable energy.

THE SOLUTION

! Based on a unique partnership model, DONG Energy has been able to attract partners ranging from Danish and international pension funds to large industrial players like Danish Kirkbi or Japanese Marubeni for its offshore wind projects.

For those partners, confidence in their investments has been based on three pillars: confidence in the developer, long-term commitments between partners, with the developer taking a majority stake in the project, and a risk-sharing model that allows the investor to only assume the risks they are comfortable with. Typically, risks associated with the development and construction of a wind farm are borne by DONG Energy, delivering the project at a fixed price and by a fixed date.

WHY A SUSTAINIA100 SOLUTION?

? Financing, particularly in the wake of the global economic crisis, is one of the key challenges for the transition to a sustainable energy supply. DONG Energy is already bringing large financial players into the renewable energy sector, and with joint effort making wind energy a long-term sustainable energy resource.

1. European Wind Energy Association (2012): "Wind in power - 2011 European statistics."



DENMARK



www.dongenergy.com



HYDROKINETIC ENERGY



ECONOMIC

Pike Research estimates that worldwide tidal energy capacity will reach 2.4 GW in 2017.³



SOCIAL

Whereas large-scale hydropower development projects involve relocations of local populations, projects like this harness hydrokinetic energy at no social cost.



ENVIRONMENTAL

The project delivers energy without compromising local marine environments.

→ Turbines powered by natural river flows, ebbs, and tides promise to liberate hydropower from its local, social, and environmental sustainability challenges.

THE SOLUTION

! Submerged turbines produce electricity from natural water flows. Just as wind turbines leverage the energy of air flows, Verdant Power's Free Flow Kinetic Hydropower System leverages the energy of New York City's East River natural tidal flows to generate electricity.

In January 2012, Verdant Power received a license from the U.S. Department of Energy to expand its East River demonstration plant to commercial scale operation (1 MW). According to the U.S. Federal Energy Regulatory Commission, many more projects are on the way, with Verdant Power's technology being one of many promising hydrokinetic technologies.¹

WHY A SUSTAINIA100 SOLUTION?

? Though hydropower already contributes a significant share of global electricity generation (16%)², large-scale hydropower projects are often developed at the expense of local populations and ecosystems. Verdant Power's turbine technology holds the promise of leveraging natural river flows for commercial power production without sacrificing local environments and displacing populations.

1. ferc.gov, Jan. 23 2012, FERC Issues First Pilot License for Tidal Power Project in New York
2. International Energy Agency (2011): Key World Energy Statistics.
3. businesswire.com, Feb. 8 2012, Marine and Hydrokinetic Power Generation Installed Capacity..



USA

www.verdantpower.com



Photo: Kris Unger/Verdant Power, Inc



SOLAR HOME SYSTEMS

→ Combining mobile and solar technology, this solution provides solar power with the affordability of pay-as-you-go, to deliver health and economic benefits for rural communities in developing countries.

THE SOLUTION

! Indigo pay-as-you-go solar is a residential solar system paid for with scratchcards through a service model. Users receive 8 hours of smoke-free lighting for two rooms and mobile phone charging, whilst cutting their weekly energy expenses by 50% or more. Customers can progressively upgrade to larger systems over time, to access more electricity and ultimately reach full home electrification. This “pay-as-you-grow” business model assists users to earn their way out of poverty without handouts or charity.

WHY A SUSTAINIA100 SOLUTION?

? 1.6 billion people lack access to electricity, and are forced to use fossil fuels such as kerosene in simple lamps each day for basic lighting. Indigo is already having a transformative impact on the lives of families in Kenya, Malawi, Zambia, and South Sudan by improving their health, economic opportunity, and environment.



ECONOMIC

According to a study done by the company, Indigo provides clean energy as a service that saves users over 50% on their fossil fuel energy costs.



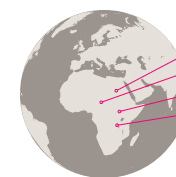
SOCIAL

Indigo replaces kerosene for lighting; poisonous kerosene fumes are estimated by the WHO to result in 1.6 million deaths annually.¹



ENVIRONMENTAL

Fossil fuel combustion for lighting has a carbon footprint roughly equivalent to the annual emissions Argentina.²



SOUTH SUDAN
ZAMBIA
KENYA
MALAWI

1. WHO, "Indoor air pollution and household energy"
2. Lawrence Berkeley National Lab, "The Lumina Project": www.light.lbl.gov; U.S. Energy Information Administration



SOLAR CELL PHONE INFRA-STRUCTURE

→ Powering telecommunications, empowering communities - solar cell phone infrastructure is enabling rural communities in developing countries to cross the digital divide.



ECONOMIC

Flexenclosure's E-site can reduce mobile operators' operating costs by up to 90%, enabling telecom network expansions that drive economic growth.



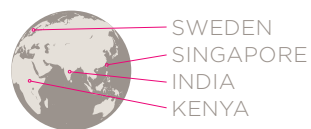
SOCIAL

E-site increases the viability of providing telecommunications to "the next billion users" in developing countries.



ENVIRONMENTAL

The technology reduces carbon emissions, as well as noise pollution from diesel generators.



www.flexenclosure.com



RECYCLING SCRAP TIRES

→ Proven a profitable business model, scrap tire recycling saves rubber and steel, avoids new production, and conserves valuable resources.



ECONOMIC

In 2013, Genan plans to open the world's largest tire recycling plant.



SOCIAL

Health problems (malaria, vermin) connected to land-filling of scrap tires are reduced.



ENVIRONMENTAL

One to two tons of CO₂ emissions per ton of scrap tire input is saved compared to alternative disposal methods (co-incineration, filling operations).



www.genan.eu

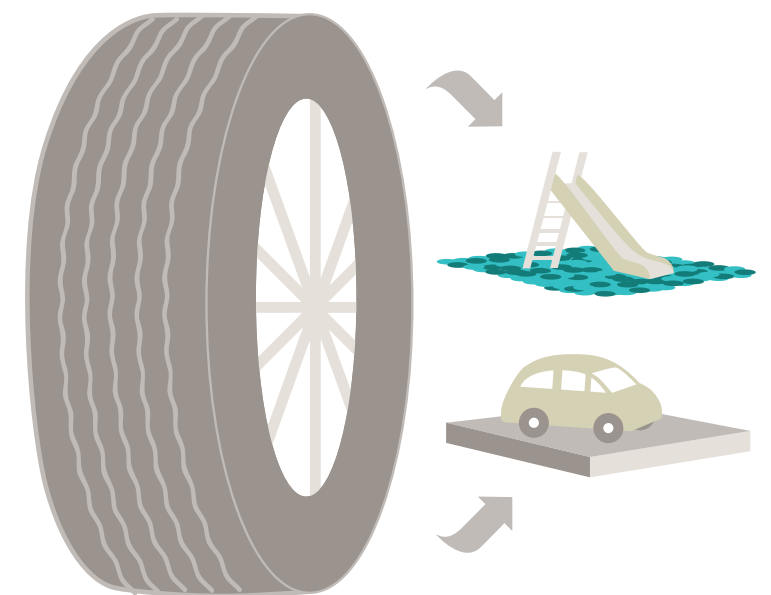
THE SOLUTION

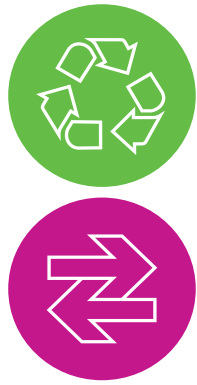
! Recycling company Genan turns scrap tires into their original components: rubber, steel, and textiles. The reclaimed materials replace virgin resources in, for example, artificial turf pitches, rubber-modified asphalt, and new steel production. The technology is completely automated, with no human hands touching the tires from start to finish.

The solution solves a growing waste problem, saves resources, and creates considerable climate benefits. According to Genan, 99% of the tires are recycled into raw materials.

WHY A SUSTAINIA100 SOLUTION?

? Recycling is sustainable by definition. Reusing rather than disposing of materials reduces the need for extraction of new resources. As the world market prices of synthetic and natural rubber and steel are expected to continue to increase in the long term, Genan represents a sustainable business model to supply these valuable resources.





PRODUCING BIOFUELS AND PLASTICS

→ Used as fuel for cars, trucks, boats, and even planes, isobutanol holds great promise as one solution on the way towards sustainable transportation. And now it's being produced at commercial scale.



ECONOMIC

According to Gevo, the retrofitted ethanol plant in Luverne, Minnesota, should be producing 1 million gallons of fuel per month by the end of 2012.



ENVIRONMENTAL

Approved by the U.S. EPA, Gevo was the first company to have isobutanol registered as a certified gasoline blendstock.

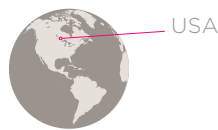
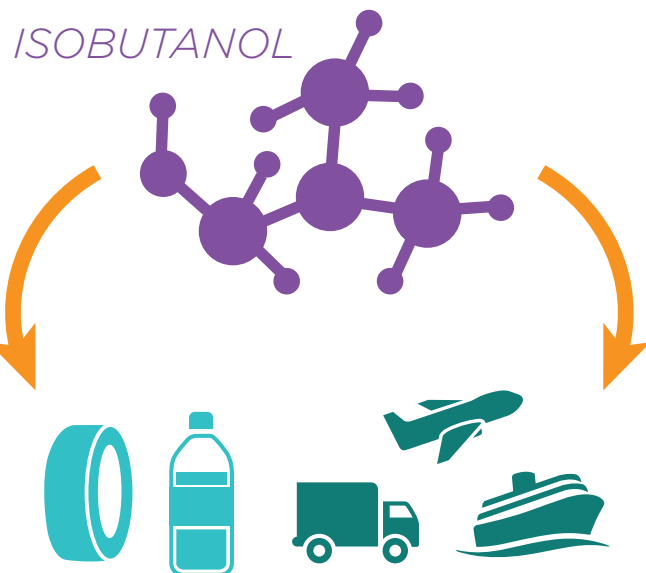
THE SOLUTION

! Isobutanol can be produced from corn starch, cellulosic materials, agricultural residues, and other ethanol feedstocks. It's an alcohol that can be shipped in existing pipelines and blended with a variety of fossil fuel-based materials to produce greener versions of jet fuel, diesel, or rubber.

Colorado-based Gevo has developed yeast that consumes common feedstocks and secretes isobutanol. According to the company, they have commercialized isobutanol production as a blendstock in gasoline and jet fuels. It can also be converted into products such as plastics, fibers, rubber, and other polymers. Gevo produces the isobutanol in retrofitted ethanol plants.

WHY A SUSTAINIA100 SOLUTION?

? Isobutanol could solve some of the problems associated with first-generation biofuels because of its compatibility with gasoline engines and infrastructure like pipelines and fuel pumps. In addition, isobutanol is one of the most promising solutions to the challenge of creating a sustainable aviation industry. The transformative potential of this solution is huge; next steps are to further commercialize and reduce costs of production.



www.gevo.com



COOPERATIVE SOLAR

→ Not every homeowner can go solar. But everyone can invest in community solar projects that generate clean energy, create local jobs, and earn a 5% to 10% return on investment.



ECONOMIC

Solar Mosaic has crowdfunded over \$350,000 to install five rooftop solar power plants.



SOCIAL

The five rooftop solar plants saved cash-strapped community organizations more than \$600,000 on their utility bills and produced over 2,700 job hours for local workers.



ENVIRONMENTAL

Already, Solar Mosaic has prevented the release of carbon equivalent to planting 4,600 trees.

THE SOLUTION

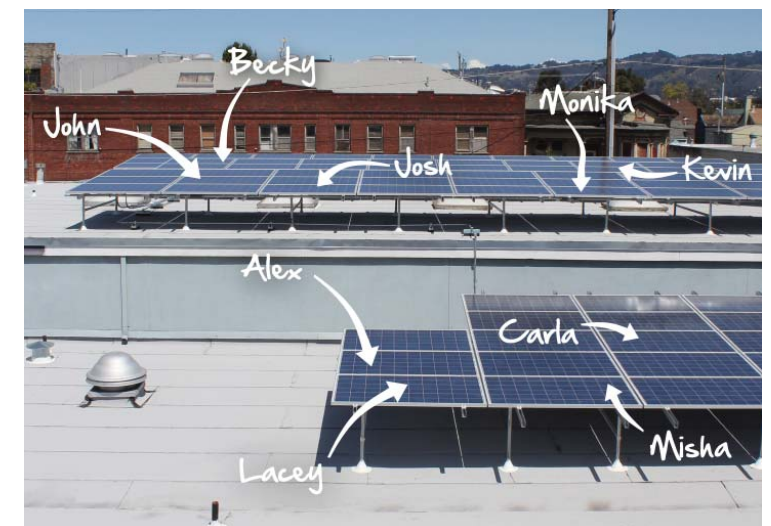
! Individuals come together to invest in solar projects that benefit communities and investors. Solar Mosaic is an online platform that connects individuals to profitable solar projects in their communities. Solar Mosaic enables individuals to earn a profit on clean energy investments, unlocking new funding streams for renewable energy.

WHY A SUSTAINIA100 SOLUTION?

? By turning solar investments into a socially engaging and financially attractive experience, Solar Mosaic enables millions of people to move their money out of big banks and into local more cost effective large scale solar energy projects. By inviting individuals to take ownership over their power supply, Solar Mosaic changes attitudes at the individual level, while providing a return on investment, clean energy, jobs, and community engagement.



www.solarmosaic.com





LEASING RENEWABLES

→ Renewable energy projects generally require large upfront investment and minimal operation and maintenance costs. Leasing renewable energy is a way of unlocking financing for renewable energy projects in times when credit can be scarce.



ECONOMIC

By renting solar panels, consumers save on their electricity bill – resulting in net savings for them and profits for SolarCity.



ENVIRONMENTAL

According to SolarCity, installing a solar system atop a typical 3-bedroom home will offset carbon emissions equivalent to driving a car 100,000 miles a year.

THE SOLUTION

! Instead of buying the solar panels on your roof or the wind turbine in your backyard, why not rent it? We are used to renting everything from apartments to movies. We do so because, for one reason or another, we don't want to pay the sticker price for these goods.

Renewable energy, characterized by high upfront investment costs and relatively long payback periods, faces an investment barrier. One of the solutions to unleash investments in renewable energy is leasing.

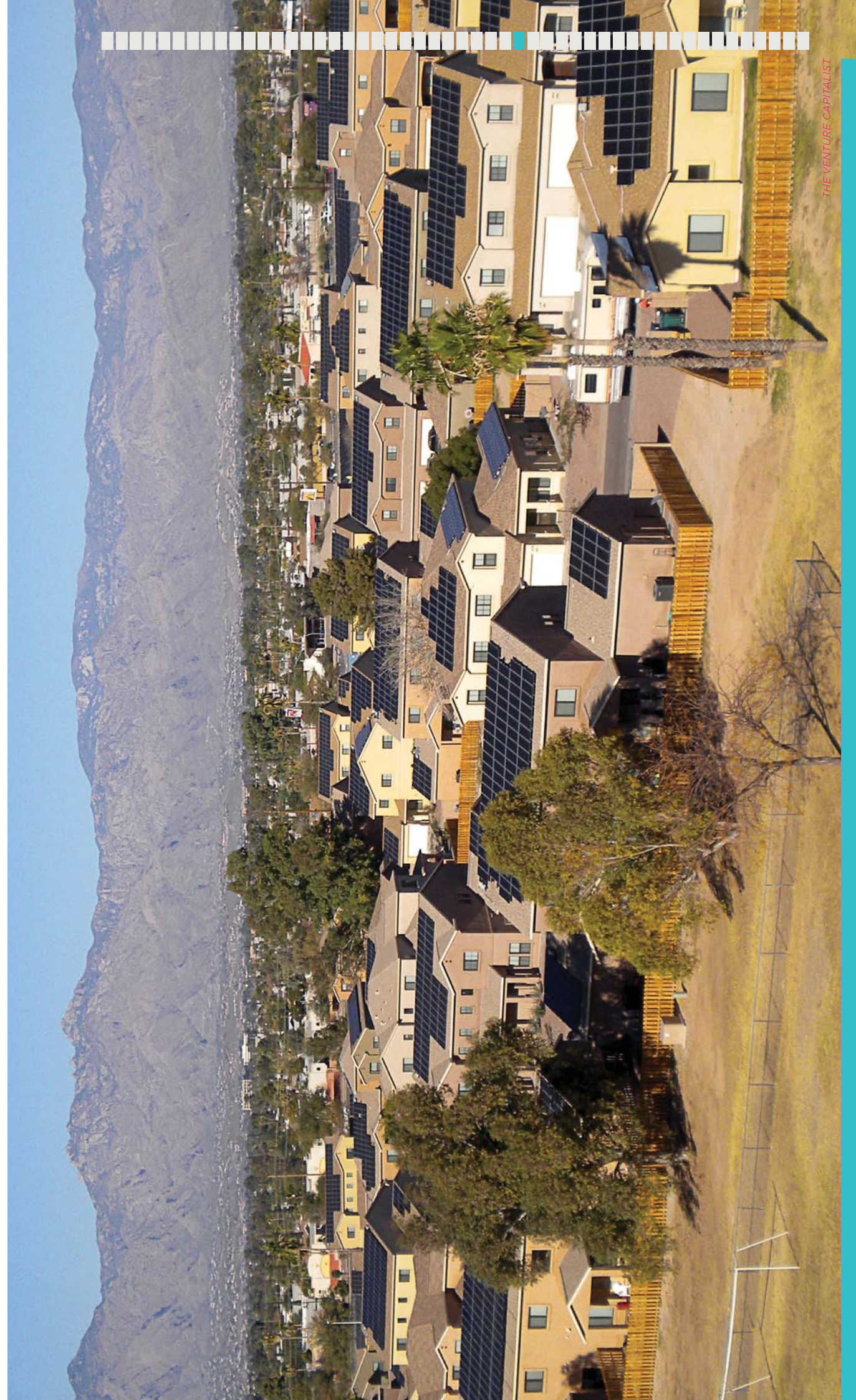
SolarCity offers to install a solar system on your roof at no upfront cost with a guaranteed price for electricity for the duration of the lease. Because energy prices are expected to increase over time – which they have historically – savings increase over time. For some customers, depending on local electricity prices and household electricity consumption, net savings may be achieved from day one.

WHY A SUSTAINIA100 SOLUTION?

? The upfront cost of investing in solar energy is a deterrent for many. By providing the option to lease solar panels, the market is expanded, with financial benefits accruing to the consumer and the financier.



USA





RETHINKING NATURAL VENTILATION

→ A healthy indoor climate ensures indoor comfort. With the e-stack system, an optimal indoor climate is achieved with minimal energy consumption.

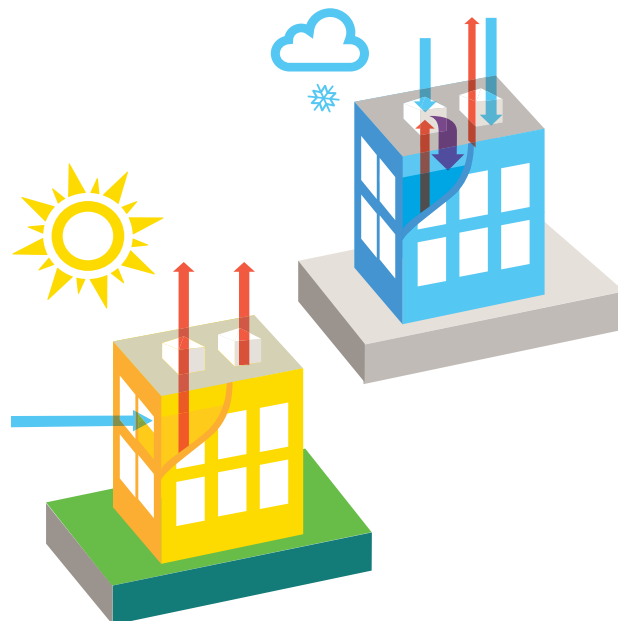
THE SOLUTION

! Using the principles of natural mixing ventilation in winter and natural upward displacement ventilation in the summer, Breathing Buildings offers a cost-effective and energy-efficient alternative to traditional ventilation systems.

The e-stack system is controlled by a device that responds to variations in temperature and CO₂ levels. The system also includes low-energy fans, which may be used to enhance the flow in extreme conditions and thereby provide a reliable, engineered low-energy ventilation system.

WHY A SUSTAINIA100 SOLUTION?

? Ensuring optimal indoor comfort requires a healthy indoor climate. A poor indoor climate is a common cause of poor health and low productivity. Using a patent-pending technology developed by the University of Cambridge, the e-stack system maintains a minimum rate of air change between a building and the outdoors, while minimizing the heating energy required. Throughout the process, the e-stack system ensures that the air quality remains very high.



UNITED KINGDOM

www.breathingbuildings.com



SOLAR POWER WITH STORAGE

ECONOMIC
Gemasolar reduces the deficit in Spain's balance of payments by \$25 million at today's crude oil prices by preventing the import of 217,000 barrels of oil each year.

ENVIRONMENTAL
Gemasolar is capable of reducing annual CO₂ emissions by more than 30,000 tons, thereby avoiding the need to burn 89,000 tons of lignite.

→ 2011 saw Spain inaugurate the world's first power plant to combine a tower receiver for concentrated solar power with a molten salt thermal storage system.

THE SOLUTION

! In October 2011, the Gemasolar Concentrated Solar Power (CSP) plant was inaugurated in Spain. 2,650 mirrors called heliostats track the sun and reflect its light onto a central point at the top of the tower receiver where a molten salt fluid circulates. This fluid is pumped up to the tower from a "cold tank"; it retains heat from the tower, and is returned to a "hot storage tank." The heated salt is used to produce steam, which drives a turbine that generates electricity.

The heated salt can be stored in a heat tank for up to 15 hours. This allows Gemasolar to deliver power to the grid based on demand. Gemasolar delivers enough power to supply 27,500 households.

WHY A SUSTAINIA100 SOLUTION?

? Each day, the Earth receives on the order of 6,000 times its total energy needs from the sun. CSP is one of several ways to harness that energy for heat and electricity production. The Gemasolar plant is unique in its combination of CSP and thermal storage.

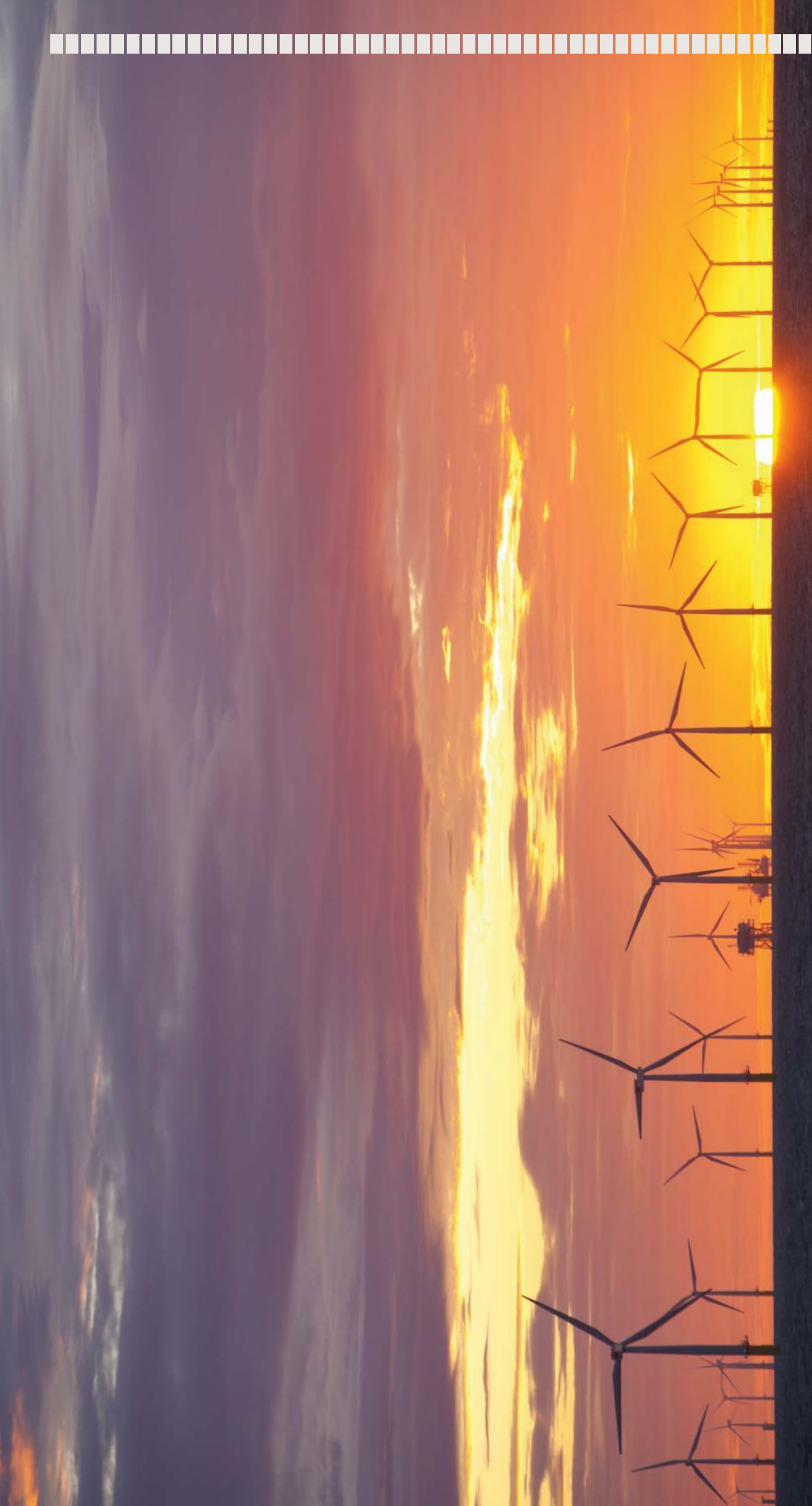


SPAIN

www.torresolenergy.com



Photo: Torresol Energy



OFFSHORE WIND



ECONOMIC

Worldwide installed wind capacity has increased ten-fold over the past decade.¹



SOCIAL

Offshore wind parks provide the benefit of renewable wind electricity without the visual and noise impact of onshore wind energy.



ENVIRONMENTAL

The greenhouse gas emissions associated with wind energy are roughly 80 times lower than for coal-fired power plants.²

→ Though wind energy already contributes significantly to electricity generation in some countries, the potential of this technology is still great.

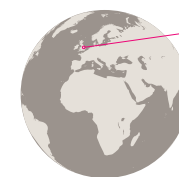
THE SOLUTION

! Wind turbines harness the energy of the wind and convert it into electricity. Though the technology is old, the potential for further expansion is massive – on land and at sea – and the size of the turbines is growing while production costs are decreasing.

Inaugurated in February 2012, the world's largest offshore wind farm – the Walney Offshore Wind Farm – is capable of providing renewable electricity to 320,000 households. Constructed by DONG Energy at a record-setting pace, it has an installed capacity of 367.5 MW.

WHY A SUSTAINIA100 SOLUTION?

? Offshore has strong potential due to higher and more consistent wind speeds than onshore sites, and lower visual impacts and noise pollution on land. Further, the Walney project is an example of an innovative and collaborative financing model delivering large amounts of external funding into the project from a consortium of the Dutch pension fund service provider PGGM and Ampere Equity Fund.



UNITED KINGDOM



The Politician

*YOU PROVIDE
THE FRAMEWORK
THAT DRIVES
SOCIETIES IN A
MORE SUSTAINABLE
DIRECTION, WHILE
ENGAGING THE
ELECTORATE IN THIS
COLLABORATIVE
EFFORT*



LAKE WATER COOLING

→ Utilizing naturally cold lake water for district cooling saves Torontonians money and reduces damage to the environment.



ECONOMIC

Enwave Energy Corporation provides clients with competitive energy rates and saves them the upfront cost of installing and maintaining expensive chillers.



ENVIRONMENTAL

The system removes 79,000 tons of CO2 from the atmosphere annually, equivalent to removing 15,800 cars from the road.

THE SOLUTION

! Naturally cold water deep below the surface of Lake Ontario is an untapped source of clean, reliable, cost-competitive, and 100% renewable energy for cooling. Using this water to cool Toronto's buildings provides businesses with a sustainable solution to their cooling needs. It respects the environment by saving electricity, eliminating noisy air chillers on roofs and saves them money.

Three intake pipes carry cold water through 12 kilometers of pipe running under the roads of Toronto. The water is used to cool over 25 million square feet of offices, hospitals, and government buildings. Since the cost of providing this service is independent of rapidly fluctuating electricity costs, Enwave can guarantee its rates for up to 20 years. After Enwave uses the water for space cooling, it is transported to a high-level pumping station and added to the city's drinking water supply.

WHY A SUSTAINIA100 SOLUTION?

? Municipalities around the world are constantly looking for ways to keep energy costs down even as their infrastructure expands. For eight years, Toronto's Deep Lake Water Cooling system has provided a solution to this problem, without forsaking economic sustainability. Installed in new buildings and added to old ones, the technology is a feasible alternative for property owners searching for sustainable cooling solutions. In cities across the world like Stockholm, Barcelona and Copenhagen cold seawater is contributing to improve the efficiency of district cooling systems.



TORONTO, CANADA



www.enwave.com



CURITIBA - BUS RAPID TRANSIT

→ Seventy percent of Curitiba's commuters use public transport. The reason is a re-design of the city's existing bus system into a bus rapid transit (BRT) system.



ECONOMIC

Citizens of Curitiba spend only about 10% of their income on travel - much below the national average.



SOCIAL

Low-cost and efficient public transportation allows all citizens to utilize the extensive system.



ENVIRONMENTAL

Curitiba uses about 30% less fuel per capita than the rest of Brazil, resulting in one of the lowest rates of air pollution in the country.

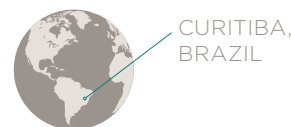
THE SOLUTION

! In 1966, Curitiba's city planning team formulated several principles that have guided the city's planning ever since. These included promoting public transportation over private means, supporting human needs over corporate interests, and meeting the needs of the poorest.

The bus rapid transit system resembles a metro, but is instead a low-cost, ground-level solution. Buses run frequently, some every 90 seconds, carrying up to 20,000 passengers an hour. Buses have exclusive driving lanes, and bus drivers control the traffic lights to insure flow. Fare collection takes place prior to boarding, ensuring quick passenger loading and unloading.

WHY A SUSTAINIA100 SOLUTION?

? Curitiba's BRT triggered a modal shift from car to bus travel. The city has one of the most heavily used, yet low-cost, transit systems in the world. The majority of Curitiba commuters use the BRT to travel to work, resulting in reduced congestion air pollution for the 2.2 million inhabitants of greater Curitiba.



CURITIBA, BRAZIL



www.curitiba.pr.gov.br



BIKELANES IN COPENHAGEN

→ Copenhagen has ensured that people can use their bikes to move around in a fast, convenient, and sustainable manner.



ECONOMIC

Looking at the total cost of air pollution, accidents, congestion, noise, and wear and tear on infrastructure, Copenhagen saves \$0.07 for every kilometer travelled by bike instead of a car.



SOCIAL

According to the British Medical Association, half an hour of cycling daily increases your mean life expectancy by 1-2 years, and cyclists are more likely to experience enjoyment from the rides than bus passengers or drivers.



ENVIRONMENTAL

Reduced noise, air pollution, and CO₂ emissions (90,000 ton reduction annually in Copenhagen).

THE SOLUTION

! In Copenhagen, urban planners have gone beyond making cycling possible; they have made it the norm. Currently, more than a third of all trips to work or school in Copenhagen are made by bike. Continued and dedicated efforts have improved the conditions for cyclists in the city. The solution reduces congestion, energy consumption, air pollution, and improves life expectancy, quality of life, and the bottom line of the city.

A coherent system of cycle tracks cut through the city. Short cuts have been created across water, and special "green wave" traffic lights respond to cyclists – improvements that enable bikes to beat cars on several routes. As a result, the majority choose quick and convenient cycling as their preferred way of getting around.

WHY A SUSTAINIA100 SOLUTION?

? Mobility is a basic human need. However, the consequences of the millions and millions of cars occupying our cities are air pollution, congestion, increased obesity from an inactive lifestyle, traffic noise, greenhouse gas emissions, and an urban landscape that alienates people. All this the result of cities in the past century being built for cars, not people. Cycling is a solution to all these problems.



Photo: Troels Heien



COPENHAGEN, DENMARK

www.kk.dk



SUSTAINABLE SECURITY

→ Greening the world's armies will accelerate the global sustainable transition. In the world's largest army, the transition is already underway. The objective is not greener wars, but greater global stability.



ECONOMIC

Military procurement triggers more capital investment and jobs; economies of scale lower the cost of sustainable technologies.



SOCIAL

More affordable clean energy for billions of people without access to power.



ENVIRONMENTAL

Significant reductions in carbon emissions, water consumption, and environmental damage.

THE SOLUTION

! The U.S. Military reportedly is the single largest industrial oil consumer in the world.¹ It plans to obtain 25% of all its energy from renewables by 2025.² Key military thought leaders have concluded that global sustainability is an international security imperative.³

Scores of sustainable energy projects have been completed, such as solar-powered field operations, hazardous materials management, and biofuels for vehicles, and many more are in the pipeline. President Obama has directed military bases to collaborate on sustainability with their host communities.

WHY A SUSTAINIA100 SOLUTION?

? Advancing the realization that sustainable development is a global security imperative promises to elevate sustainability into one of the international community's highest priorities.

The U.S. Military putting its capital weight behind sustainable research and deployment makes a difference. Pike Research predicts that global military spending on renewable energy could grow from \$1.8 billion in 2010 to \$26 billion in 2030, leading to "full commercialization of these technologies."² Though sustainable development and defense advocates may seem to be strange bedfellows, the potential of their collaboration is not greener wars, but greater world stability and peace.

1. The Daily Energy report (2011): "How Much Energy Does the U.S. Military Consume".
2. White House press release (April 11, 2012): "Fact Sheet: Obama Administration Announces Additional



USA

- Steps to Increase Energy Security".
3. Executive Order 13514, Section 1. www.whitehouse.gov
4. Pike Research (2011): "Renewable Energy for Military Applications".

www.defense.gov



U.S. Marine Corps photo by Lance Cpl. Michael C. Neri. Marines at Camp Pendleton, Calif., test solar panels to help reduce the need for supplies in the field.



LOCAL DISTRICT HEATING

→ Even in small communities, district heating can integrate a number of local renewable energy sources.

THE SOLUTION

! Norway prefers to export their vast resources of hydropower and oil and use local renewable resources, if possible, for domestic energy consumption. Some towns are too small for cost-effective combined heat and power (CHP) plant – but other opportunities are available. Akershus Energi has, in Lillestrøm, for the first time in Norway, developed a small district heating system (160 GWh/yr) which is supplied almost entirely with local renewable energy sources: Wood chip boilers with condensation; large-scale solar water heating with a heat accumulator; landfill gas; heat pumps to utilize surplus hydro; and bio oil to meet peak demand.

Akershus Energipark is recognized in the International Panel on Climate Change's report on renewable energy as an excellent example of how to integrate renewable energy for heating into the energy system.

WHY A SUSTAINIA100 SOLUTION?

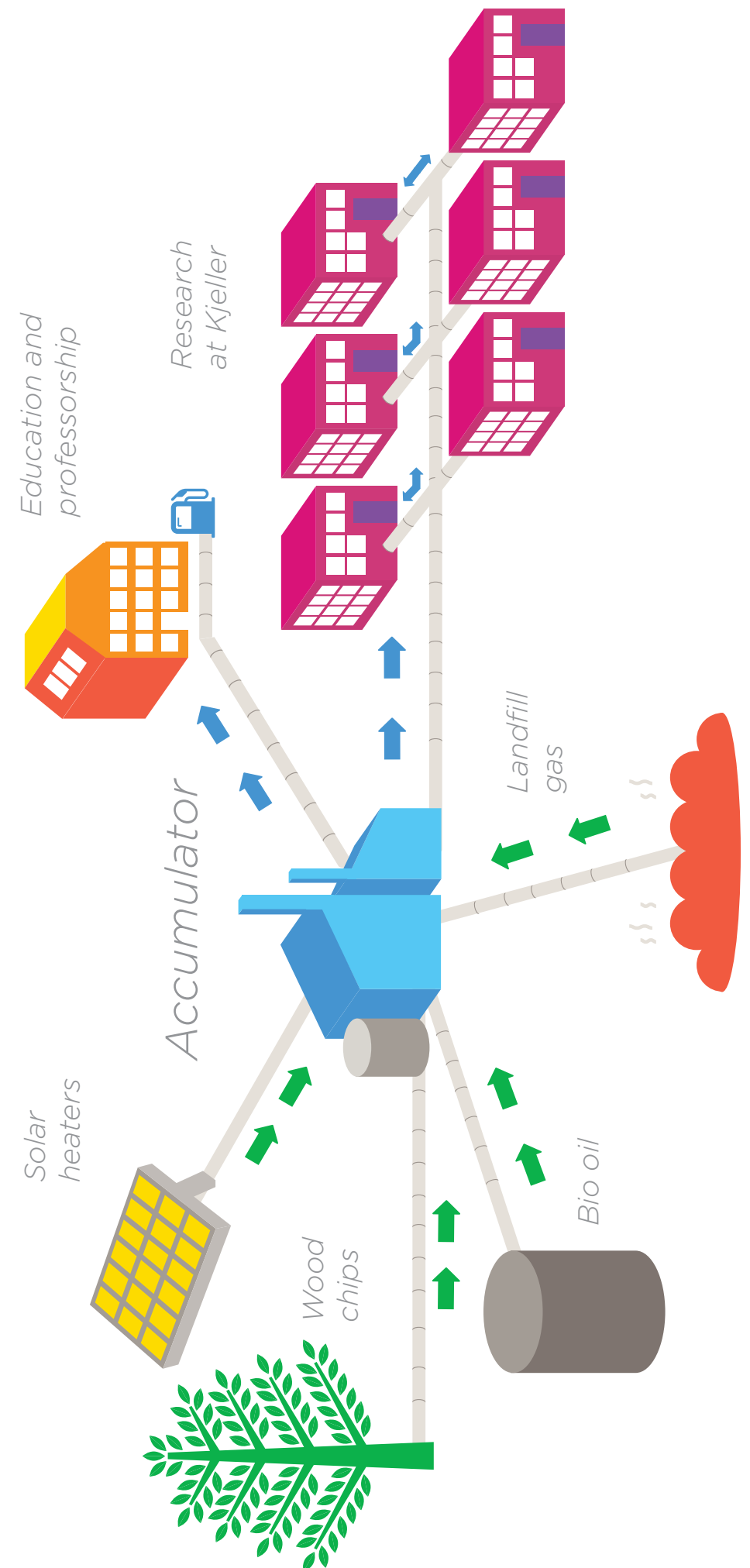
? District heating provides a cost-effective option for integrating a multiple of renewable energy sources. The Akershus approach proves that many towns and villages have sufficient heat loads to establish a heating infrastructure that will permit them to store and use local clean energy resources.

ECONOMIC
Akershus Energi can provide cost-effective heating based on renewable energy sources.

ENVIRONMENTAL
The environmental impact of using the renewable sources, via district heating, is much lower than it would be with individual solutions, in particular wood.



NORWAY





SOLAR-FUELLED URBAN DISTRIBUTION

→ Commercial city centers rely on a consistent supply of goods. Solar-powered mini trucks provide a reliable and sustainable way of urban delivery.

THE SOLUTION

! Taking a holistic approach to delivery, Cargohopper provides a new approach to distributing supplies to the commercial heart of Utrecht, in the Netherlands. Cargohopper distributes through solar-powered electric mini trucks, which are well-suited to deliver goods to hard-to-access inner-city areas.

Conventional trucks deliver goods to a distribution center outside the city. Here, goods are preloaded in trailer-sized boxes and lifted into the Cargohopper, which takes goods to the city center. By hauling cardboard and paper for recycling on its return journeys, the Cargohopper is never empty.

WHY A SUSTAINIA100 SOLUTION?

? Easy, fast, and reliable delivery is essential to keep the commercial heart of a city alive. Yet, due to restricted delivery hours, traffic congestion, and environmental regulations, ensuring the supply of goods isn't easy. Small solar-powered electric vehicles, combined with innovative infrastructure solutions, could make cities around the world more livable and yield substantial environmental benefits.



ECONOMIC

A saving of roughly 5,200 gallons of diesel annually by taking conventional vehicles off the streets.



SOCIAL

Roughly 4.6 million people die every year from causes directly attributable to air pollution; and motorized vehicles are a large source of the problem.



ENVIRONMENTAL

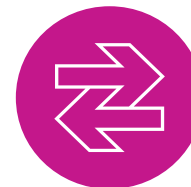
A savings of roughly 33 tons of CO2 annually by swapping fossil-fuel powered vehicles for solar-powered ones.



THE NETHERLANDS



www.cargohopper.nl



HIGH-SPEED RAIL

→ For trips under 800 kilometers, high-speed rail (HSR) is a proven alternative to travel by air or car. In Spain, HSR has lured passengers from airlines and reduced CO2 emissions.

THE SOLUTION

! Spain opened its first HSR line, Madrid-Sevilla, in 1992. By December 2011, the AVE (Alta Velocidad Española) had grown to 2,665 km, the longest HSR network in Europe. Running at a top speed of 300 km per hour, with a 99% on-time record, the electrified AVE has eroded market share from airlines competing on the same routes.

RENFE, the state-owned train operator, says it has lured away nearly 50% of air passengers on the 600-km Barcelona-Madrid route. Passengers choosing the train are also saving carbon. According to RENFE, a passenger using the AVE for the journey from Barcelona to Madrid is responsible for generating 13 kg of CO2; the same trip by plane generates 70 kg of CO2. Spain plans to expand the AVE network by another 10,000 km by 2020.

WHY A SUSTAINIA100 SOLUTION?

? The success of HSR in Spain proves that, given an affordable alternative to planes and cars, travellers will increasingly opt for less carbon-intensive trains.



ECONOMIC

When complete, 90% of Spain's 47 million people will live within about 50 km of an AVE station.

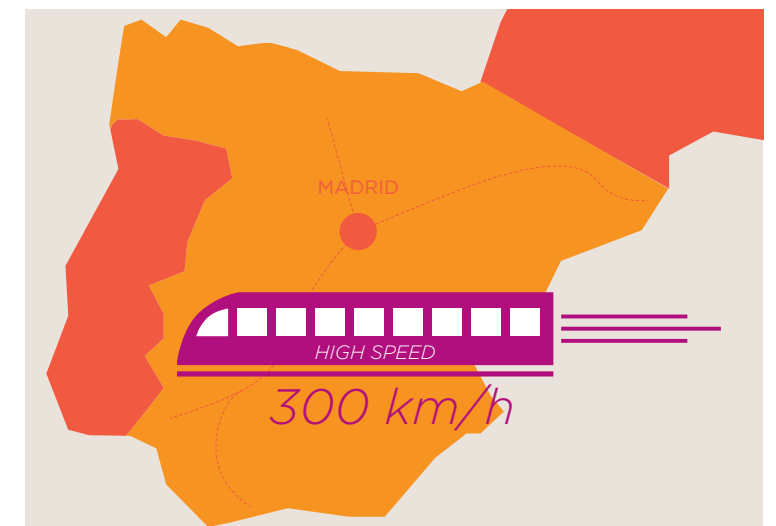


ENVIRONMENTAL

RENFE estimates the CO2 savings from passengers opting for the AVE over planes and cars on the Madrid-Zaragoza-Barcelona corridor at more than 200,000 tonnes annually.



SPAIN



www.renfe.com



BIOGAS FOR HEATING AND TRANSPORT

→ Reliance on imported oil and gas leaves cities and regions vulnerable to price shocks and supply disruptions. Turning to locally sourced biogas can save money, slash CO₂ emissions, and improve energy security.



ECONOMIC

Kristianstad cut the annual bill to heat its municipal buildings by more than half when it swapped oil and electricity for biogas.



SOCIAL

By using local biogas to heat its homes and fuel its cars, Kristianstad is less dependent on imported fuel, which improves regional economic and energy security.



ENVIRONMENTAL

By 2020, Kristianstad city planners expect greenhouse gas emissions to be 40% below 1990 levels.



SWEDEN, KRISTIANSTAD



www.kristianstad.se/biogas



CHARGING INFRASTRUCTURE FOR EV'S

→ Public charge spots located at workplaces, city buildings, shopping centres, and parking garages ensure that EV owners can top off their batteries when they're on the go.



ECONOMIC

More than 875 organizations provide EV charging via the Coulomb network, including shopping centres eager to lure customers.



ENVIRONMENTAL

Stations in the ChargePoint Network dispense 462 megawatt-hours of electric fuel monthly.



USA



www.coulombtech.com



NORTH SEA OFFSHORE GRID



ECONOMIC

Grid interconnection improves overall system efficiency, resulting in less blackouts and lower electricity prices.



ENVIRONMENTAL

Grid interconnection, especially in this case, allows for higher rates of fluctuating renewable energy penetration.

→ Letting the vast Norwegian hydropower reserves act as back-up capacity for the rest of Northern Europe enables higher rates of renewable energy.

THE SOLUTION

! “Norway can help Europe introduce more volatile renewable energy sources into the market by providing a sustainable backup,” said Nobuo Tanaka, Executive Director, International Energy Agency, in August 2010.

Intended as an important part of the future European supergrid, the North Sea offshore grid will connect Northern Europe with planned wind farms in the North Sea and the large Norwegian and Swedish hydropower reserves. High-Voltage Direct Current (HVDC) cables provide for low transmission losses over long distances, enabling Norwegian and Swedish hydropower to act as back-up capacity for the further integration of intermittent renewables in the rest of Northern Europe. This Power Grid will efficiently supplement the already existing connections in Northern Europe and in particular increase the value of all wind farms in the North Sea.

WHY A SUSTAINIA100 SOLUTION?

? Though this project is still in the planning stage, it is included for its ability to enable higher penetration rates of renewable energy in Northern Europe and improve the overall efficiency of the grid. Grid interconnection in general improves efficiency and stability, while reducing the need for heavily polluting, fossil fuel -powered back-up generating capacity.



NORTH SEA



URBAN CORRIDORS FOR MASS TRANSIT

→ Nearly 100 cities launched bus rapid transit (BRT) systems from 2000-2010. Buses in the systems operate much like trains, with exclusive or priority lanes and pay-before-you-board stations.



ECONOMIC

Guangzhou's BRT system carries more passengers per hour than any metro line in mainland China outside of Beijing.



SOCIAL

The BRT system improves quality of life for residents, reducing travel time for motorists and bus riders by 20% and 29% respectively.



ENVIRONMENTAL

The BRT system will reduce Guangzhou's CO2 emissions by 86,000 tones annually.

THE SOLUTION

! By 2009, Guangzhou, China had not built a new bike lane in 12 years and was adding 300,000 cars to its streets each year. Zhongshan Avenue, a bustling street in the city's financial district, was a traffic-clogged, 12-lane free-for-all in which cars, buses, and bikes competed for the right-of-way. In February 2010, Guangzhou inaugurated a BRT corridor on a 22.5-kilometre stretch of Zhongshan Avenue, with dedicated lanes for buses and cars, and two separated bike lanes. Within a year, trips by bike increased by 50%. Travel times improved for motorists, bus riders, and cyclists. The BRT system handles 1 million passenger trips daily. Stations are designed to feed into the city's Metro and a new public bike-sharing program.

WHY A SUSTAINIA100 SOLUTION?

? BRT corridors ease congestion, reduce travel times, and slash emissions. Cities with BRT systems in place and planned include Curitiba, Brazil; Bogota, Colombia; Chicago and Los Angeles in the United States; and Delhi, India.



INTELLIGENT OUTDOOR LIGHTING

→ Smart outdoor city lighting adjusts to the ebb and flow of weather, traffic, and urban activities. Light poles "talk to the grid," delivering light when and where people need and want it.



ECONOMIC

Globally, switching to LED technology could save up to \$158 billion in reduced electricity costs.¹



SOCIAL

Over half of the global population currently lives in urban areas; this solution enhances the quality of life in cities, making them safer, better connected, and more desirable places to live and work.



ENVIRONMENTAL

Lighting accounts for 1.9 billion tons of CO2 emissions every year – equivalent to emissions from 70% of the world's passenger vehicles – switching to LED technology worldwide could save up to 670 million tons of CO2.²

THE SOLUTION

! Philips' CityTouch system can connect all the streetlights in a city – including those from other manufacturers. Each lighting pole is equipped with remote connectivity. The business model is a fee per-light-point approach that eliminates the need for upfront investment in all connectivity costs. Savings made in energy and maintenance costs are invested in new energy-efficient lighting.

The system allows dynamic, intelligent, and flexible control of lighting. Combined with LED technology, it delivers electricity and maintenance savings of up to 70%. CityTouch has been tested in pilot projects in London, Prague and Rotterdam.

WHY A SUSTAINIA100 SOLUTION?

? Lighting is responsible for 19% of the world's electricity consumption, while public spaces and commercial buildings alone represent 60% of lighting-based electricity use. New LED lighting technology could provide electricity savings of up to 80% in many applications.

A full switch to the latest energy-efficient LED lighting solutions could provide significant energy savings and a reduction in CO2 emissions as well as transform urban environments for the benefit of residents and visitors.

1. Paul Waide (2006): Light's Labour Lost.
2. Philips (2011): The LED lighting revolution.



www.philips.com



COMBINED HEAT AND POWER

→ When you produce electricity, you also produce a lot of heat – but in conventional power generation the heat goes to waste. However, in combined heat and power plants heat, hot water and electricity are generated at the same time and distributed to the consumer.

THE SOLUTION

! The Oresundsverket is a combined heat and power (CHP) plant in Malmo, Sweden – and one of the most efficient power plants in Europe. The gas-fired plant is central to Malmo's energy requirements, as it produces electricity, hot water, and heat for the city. In fact, around 40% of the city's heat demand is covered by the waste heat from the power production. The heat is distributed through the district heating system network of underground, well-insulated pipes.

WHY A SUSTAINIA100 SOLUTION?

? At a time when energy is increasingly becoming scarce, we cannot allow it to go to waste. Power plants that do not exploit the excess heat generated have efficiency rates as low as 30% The Oresundsverket can reach up to 90% efficiency at full co-generation – producing electricity and supplying heat to the city.



ECONOMIC

Once the district heating system is in place, the combined heat and power system provides low-cost heat. District heating costs around 45% to 55% less than heating from oil or natural gas for a house of 130m2 with average consumption.



SOCIAL

Compared to individual heat sources, district heating is much more convenient for end-users.

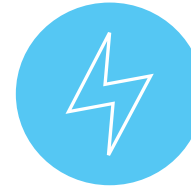


ENVIRONMENTAL

The increased efficiency of the plant equals lower fuel usage, which translates to a reduced environmental footprint for the city.



www.eon.se



A SINO-SWEDISH URBAN SOLUTION

→ Government-to-government collaboration between China and Sweden has resulted in a new sustainable city, Wuxi, in China.

THE SOLUTION

! A neighborhood within the city of Wuxi has been redeveloped according to the strictest Swedish city-planning standards. Accommodating 40,000 new residents in a sustainable community, it maintains indigenous cultural heritage and fragile wetland ecology nearby.

The design of the Wuxi eco-city was tendered in close collaboration between Chinese and Swedish state officials. The plan includes Eco Index guidelines, focusing on energy consumption, waste management, sanitation, water preservation, traffic, transport, and sustainable building designs – all integrated into the Eco-city plan.

WHY A SUSTAINIA100 SOLUTION?

? Between now and 2020, China needs to build 400 new cities. That's nearly 30 per year, housing more than 300 million people moving from the countryside. Much like a number of emerging economies, China urgently needs to integrate sustainability into its city planning to reduce pollution and ease the pressure on its energy supply. Collaborations across continents and states, such as Wuxi, can inspire and help push towards more sustainable urbanization.



ECONOMIC

An array of sustainable solutions such as combined heat and power generation from waste, recycling, and building insulation provide cost-effective sustainable solutions for Wuxi.



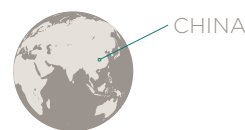
SOCIAL

Wuxi will be a pedestrian-oriented and barrier-free community.



ENVIRONMENTAL

Wetlands are preserved and re-seeded. Wuxi aims minimize its impact upon nearby national asset Taihu Lake.



www.tengbom.se



CHICAGO FOR PEDESTRIANS

→ In Chicago, a vacant area formerly home to a steel mill is transformed into a frontrunner in sustainable city planning. More than 15,000 residential units powered by clean energy will be built in liveable neighborhoods designed for walking.



ECONOMIC

As prices for energy from various sources fluctuate, the Chicago Lakeside utility will change the energy mix to minimize costs for consumers.



SOCIAL

With new parks, bike paths, beaches, and two miles of public lakefront – made accessible to the public for the first time in a century – Chicago Lakeside offers an environment for relaxing, playing, and exercising.



ENVIRONMENTAL

Each year 2.05 billion gallons of stormwater and wastewater are sent from the Lake Michigan water basin to the Gulf of Mexico, and 85% of consumer waste in Illinois ends up in landfills. Chicago Lakeside’s infrastructure concepts will reduce water pollution and improve waste management.

THE SOLUTION

! Advanced clean energy technologies, easy access to public transportation, compact neighborhoods, and innovations in water- and solid waste management – all controlled through state-of-the-art information and communication technology (ICT) networks. Under development, the new Chicago Lakeside neighbourhood, located on the city’s southeast lakefront, will use district heating and cooling powered by the sun, wind, and biomass.

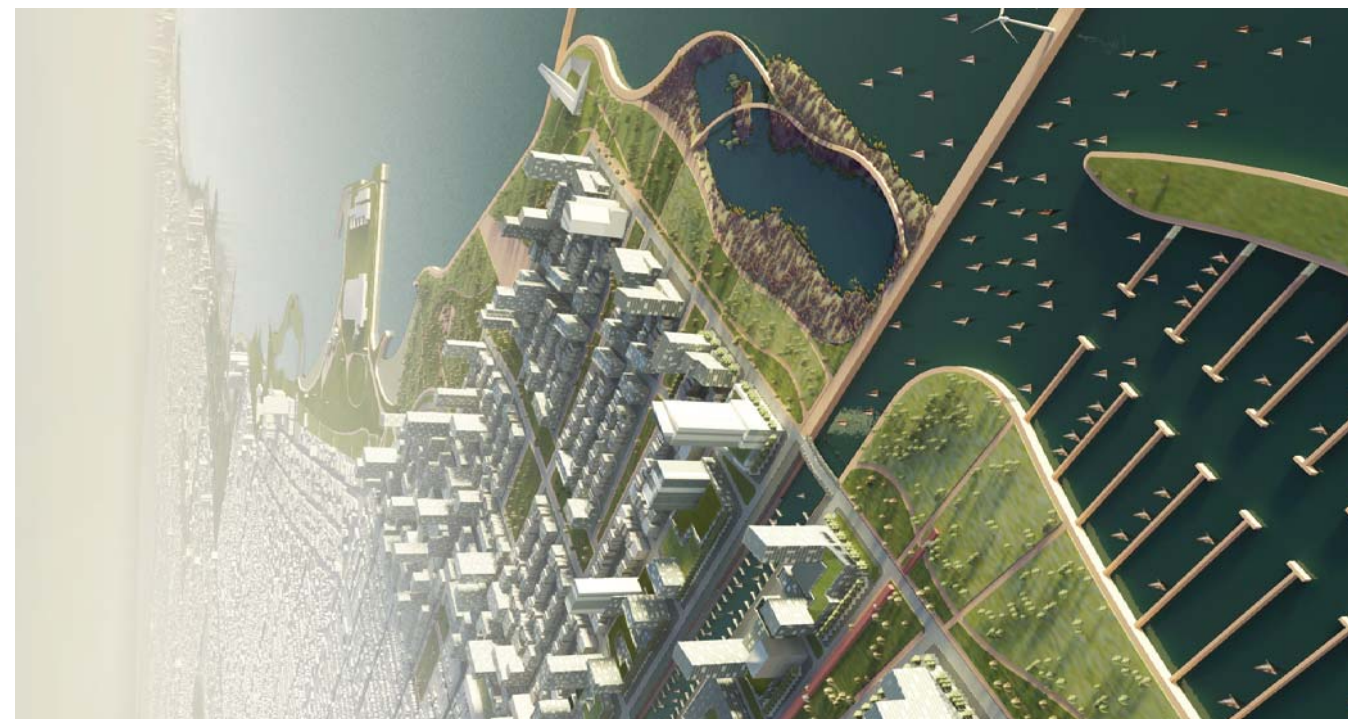
All solutions are developed in collaboration with local stakeholders, the City of Chicago, and educational and research institutions. Chicago Lakeside is designed for walkability and to reduce the need to own a car. Pedestrian-scale, community-facing architecture will create lively street-level interaction contributing to safety and well-being.

WHY A SUSTAINIA100 SOLUTION?

? Chicago Lakeside is a transformative model for US city planning and could upend the traditional thinking of how people live and work in Chicago and across the US. The solutions utilized in Chicago Lakeside have strong site-specific characteristics, but the “DNA” of the solutions is fully transferable to other cities.



CHICAGO, USA





THE SOLAR CAPITAL OF GERMANY

→ As one of the sunniest cities in Germany, efficient use of solar power is the main focus of Freiburg's efforts to be powered entirely by renewable energy.

THE SOLUTION

! The cityscape confirms Freiburg's reputation as the solar capital of Germany: solar panels blanket the roof of the stadium and City Hall, sit atop the roofs of schools, churches, private houses, and even the prison. Freiburg show off a variety of ways to harness the energy from the sun: solar photovoltaic panels, solar thermal for hot water, solar sunrooms or "winter gardens," passive solar design, solar cooling, and transparent solar insulation, which converts the solar heat that hits a wall into useable thermal energy.

WHY A SUSTAINIA100 SOLUTION?

? The efforts in Freiburg illustrate that delivering sustainable energy for a city of a quarter-million residents is possible. To reduce fossil fuel consumption, and to achieve a stable supply from renewable energy sources, Freiburg takes a holistic approach to sustainability. Decentralized renewable energy sources are combined with energy efficiency technologies to achieve sustainable heating and power supply.

1. City of Freiburg: "Green City Freiburg – Approaches to sustainability."



Photo: Solar-Fabrik AG



ECONOMIC

Over 2,000 people are employed at more than 100 businesses in the solar sector of Freiburg.¹



SOCIAL

The project "200 Families Proactively Protecting the Climate" designates residents as ambassadors for sustainability in exchange for experimenting with creating greater quality of life through daily climate protection.



ENVIRONMENTAL

With more than 1,800 hours of high-quality sunshine annually, Freiburg is ideally situated to take advantage of solar energy.



GERMANY

www.freiburg.de



DISTRICT HEATING

→ Urban populations are growing, and so is the need for heating. Luckily, smart urban planning offers a sustainable solution to this challenge: district heating.

THE SOLUTION

! In the Danish Region of Copenhagen, the City of Copenhagen, 20 local authorities, and the Danish Energy Agency have since 1980 cooperatively developed a unique integrated district heating system. It is cost-effective for society and consumers and supplies heat to 98% of the buildings in the network.

The heating produced is 95% surplus heat from multi-fuel combined heat and power (CHP) plants. 25% of the CHP is based on surplus waste from the region. The system, which is to be expanded further, is owned by four transmission companies and 20 municipal distribution companies.

Many other cities – Aarhus, Malmö, Berlin, Prague, Stockholm, Helsinki, Moscow, and Beijing among them – also benefit from city-wide district heating based on CHP.

WHY A SUSTAINIA100 SOLUTION?

? Cities need sustainable and cost-effective solutions for heating as a natural part of the urban infrastructure. Greater Copenhagen has demonstrated how this can be organized and designed to the benefit of consumers and society by combining government regulation and incentives with local commitment and co-operation.



ECONOMIC

District heating costs around 45% less than oil heating and approximately 56% less than natural gas heating for a home of 130 m² and with average consumption.



SOCIAL

Seven hundred and fifty jobs were created in developing the grid infrastructure required for the district heating system.



ENVIRONMENTAL

Carbon dioxide emissions resulting from the consumption of heat and electricity have dropped from 3,460,000 tons in 1995 to 2,541,000 tons in 2005.



DENMARK

www.kk.dk



METHODOLOGY

We believe that transparency in methodology is important for two reasons:

a) It helps our readers understand what Sustainia100 is, and the reasoning behind this guide to solutions; and **b)** It allows readers to criticize our choices and us to learn from our mistakes.

DEFINING SUSTAINABILITY

The concept of sustainable development was first introduced by the World Commission on Environment and Development, in 1987, in the report “Our Common Future” (the Brundtland report). The report defines sustainable development as

“development that meets the needs of present generations without compromising the ability of future generations to meet their own needs”. It contains within it two key concepts:

- The concept of “needs,” in particular the essential needs of the world’s poor, to which overriding priority should be given; and
- The idea of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and future needs.”

World Commission on Environment and Development (1987): “Our Common Future”

The notion of the triple bottom line springs from the Brundtland definition, and to be considered for Sustainia100, solutions must impact at least two – though preferably three – of its elements: social, environmental, and economic sustainability.

SELECTING SOLUTIONS

The research for Sustainia100 was carried out by the Sustainia secretariat in concert with the global sustainability community. An online platform enabled anyone to submit a solution, while the secretariat carried out extensive research to ensure the sectoral and geographical diversity of solutions. We relied greatly on our network of partners and their network.

Solutions were evaluated and assessed independently by the Sustainia secretariat and engineering consulting firm Ramboll according to seven criteria (see opposite page). These criteria were derived from the original Brundtland definition and the notion that solutions should have significant impacts on the triple bottom line to be a Sustainia100 solution.

CRITERIA FOR SELECTION

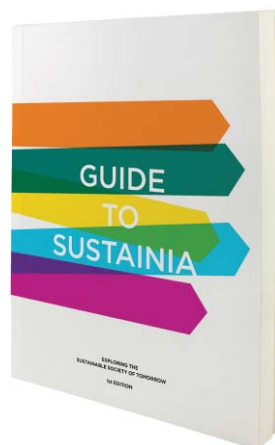
According to our selection criteria, Sustainia100 solutions should be:

- **Ready and available** – Sustainia is not an imaginary Utopia; it is a concrete proposal on how we could live a better life. Sustainia100 solutions should be based accessible technology and fully developed solutions moving us towards a sustainable society.
- **Scalable** – Too many innovative sustainability projects are never transferred or duplicated in other businesses, organizations, or communities. Sustainia100 solutions should have the potential to be transferred to other settings and overcome the problems of scaling.
- **Collaborative** – We need to join forces if Sustainia is to be reality. Sustainia100 solutions should transcend national and cultural borders and work towards building partnerships between societal sectors such as civil society, business, and the public sector.
- **Transformative** – A transformation of key elements of society is needed to reach Sustainia. Sustainia100 solutions should help change practices by companies, governments, or individuals in a direction that is fundamentally more sustainable than today.
- **Cost effective** – Solutions must be affordable in order to gain popularity. Sustainia100 solutions should be cost effective at the level of society or city. The solutions that achieve a sustainability target in the most affordable way are preferred to more expensive solutions.
- **Improved quality of life** – The sustainable life can be better and more fun than life as we know it today – this is a prerogative for bringing about real change. Sustainia100 solutions should enhance the quality of life for citizens.
- **Environmental impact** – Our happiness depends critically on the quality of our environment. Sustainia100 solutions should have a positive environmental impact.

EXPLORE MORE FROM SUSTAINIA

→ We hope you were inspired by the Sustainia100. This was the first edition, but next year there will be a new list of solutions ready for you. Until then, you can explore Sustainia further in the following.

THE BOOK “GUIDE TO SUSTAINIA”



- The full vision and integrated storytelling

“Guide to Sustainia” describes the overall vision and model of destination Sustainia, and explains in clear and simple language and illustrations how the sustainable society could look in 2020. It demonstrates a new way of communicating about sustainability.

SUSTAINIA CITY AND SECTOR GUIDES



- Exploring the sustainable cities and industries of tomorrow

The “Sustainia Guide to Copenhagen” is the first publication in our series of Sustainia city and sector guides. Our goal for the series is to visualize the benefits of living in sustainable cities and the opportunities within key sectors and industries.

THE SUSTAINIA INDEX



- The Global Sustainability Monitor

*The Sustainia Index offers a ranking of nations according to their sustainable achievements. The rankings identify the role models and provide a better understanding of how countries and regions are performing. It is the first index to combine economic, environmental, and social sustainability into **one** ranking.*

SUSTAINIA ACTION FORUM:



- Annual gathering of key decision makers committing to concrete action

The Sustainia Action Forum is not a typical conference but a forum dedicated to action. Top leaders and decision-makers from governments, businesses, and international organizations meet annually to commit to concrete action on sustainability.

SUSTAINIA AWARD CEREMONY:



- Celebrating progress on sustainable solutions

The Sustainia Action Forum also features the spectacular Sustainia Award Ceremony. Over 1,000 guests will be invited to celebrate the sustainable solutions that pave the way to a better future.

“SUSTANIA IS A
NEW AND NEED-
ED APPROACH
TO COMMUNI-
CATING SUSTAIN-
ABILITY”

Arnold Schwarzenegger
Honorary Chair of Sustainia & Founding Chair of the R20 Regions of Climate Action

“SUSTANIA CAN HELP PEOPLE GET
A CLEAR PICTURE OF WHAT THEIR
LIVES COULD BE IN A SUSTAINABLE
FUTURE - AND HOW IT WILL IMPROVE
OUR HEALTH, OUR ENVIRONMENT, OUR
ECONOMY”

Connie Hedegaard
EU Commissioner for Climate Action

“SUSTAINIA IS A CLEAR ARTICULATION
OF THE FUTURE WE WANT”

Georg Kell
Executive director of the UN Global Compact

“MOTIVATION
AND INSPIRA-
TION FOR POSI-
TIVE ACTION
WILL HELP US
MOVE FORWARD
TOWARDS A
BETTER FUTURE
FOR ALL”

Gro Harlem Brundtland
Former Prime Minister of Norway and Former Director General of WHO



SUSTAINIA FOUNDING PARTNERS:



Mondaymorning

STRATEGIC PARTNERS:



SUSTAINIA KNOWLEDGE PARTNERS:



ACKNOWLEDGEMENTS

We are grateful for the assistance of John Christensen, Head of Centre at UNEP Risoe; Philipp Rode, Executive Director and Senior Research Fellow at the London School of Economics; Bill Becker, co-director at The Future We Want; Jeff Horowitz, founding partner at AD Partners; Jesper C Christensen, PhD fellow at the University of Aarhus; Kim Behnke, Head of research and environment at Energinet.dk; ; Ningling Rao, Ph.D. and chief engineer at DONG Energy; and Claus Felby, professor at the University of Copenhagen.

A special thank go out to our community who have been a great source of inspiration and has helped us identify great solutions around the world.

→ Sustainia is a clear vision of a sustainable society, and a collaborative platform for making it real.

A vision alone will not set the world on a more sustainable path. It needs to be inspiring and realistic – built on ready and available solutions. To get to actions, we need to gather the best solutions in one place, and provide a clear overview of possibilities.

Sustainia100 solutions are great ideas, innovations, and technologies. They're building blocks that can help make Sustainia a reality.

WE HOPE YOU WILL BE INSPIRED.

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